Vol. X TORONTO, OCTOBER, 1920 No. 10

The Canadian Medical Association Journal

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The Canadian
Medical Association Journal

Vol. X. TORONTO, OCTOBER, 1920 No. 10

MEDICINE AND THE WAR

By George Adami, M.D., F.R.S.

Colonel, Canadian Army Medical Corps

NOW that close upon three months have elapsed since that memorable eleventh hour of the eleventh day of the eleventh month of 1918 when the guns ceased, the time is ripe to review an aspect of the War which interests all thoughtful people, namely, the part played by medicine and medical advance in the prosecution of the campaign. Your good physician in times of peace does not vaunt his wares, and when he dons khaki his spirit does not alter. As a result, throughout the War little that is authoritative has been published regarding the broad aspects of the work of the medical units. Correspondent after correspondent, it is true, writing from the war zone has borne witness to the wonderful way in which the army medical service has risen to the occasion, to its capacity, flexibility and devotion, but this is almost the first occasion that has offered itself for a general review of the outstanding accomplishments of the service, and fortunately my semi-detached position as an officer not of the Royal Army Medical Corps but of the Canadian Expeditionary Force permits me to speak openly and without false modesty regarding the good deeds and great achievements of my British colleagues. It is but right and fitting that the people of the Empire should realize the extent of the victory and of their debt to the R.A.M.C., for truly the conquest of disease has been the greatest and the noblest victory of all.

Here, indeed, the first difficulty presents itself. So great

A Friday afternoon lecture at the Royal Institution. Delivered February 7th, 1919.

has been the victory, so many the advances, that it is impossible to deal adequately with my topic in the course of one hour. I cannot give the complete picture, at most a rapid sketch with the high lights dashed in.

Let me in the first place begin by erasing the generally accepted picture. What has impressed the war correspondent has been the triumph of the surgeon in the care of the wounded. The general opinion, even in the profession, both before and during the War has been that the outstanding advances of the generation have been the surgical. Now at the risk of being thought paradoxical, without in the least wishing to minimize the great work accomplished by the Army Surgeon, I would lay down that *during the War surgery has played but a secondary part.* An actor of the first rank billed to perform a secondary part may enact that part so admirably as to put the leading characters into the shade. That has been the case with our War Surgeons. Their work has been of the best: they have achieved notable advances, particularly under the inspiration of General Sir Robert Jones in the treatment and after treatment of fractures and wounds of the extremities. The amount of crippling has been reduced to a very remarkable degree. But this must be said: the wounded appeal to the onlookers much more than do the victims, say, of pneumonia and dysentery. The man whose honourable scars remain as an ever present reminder of the victory of the surgeon over death brings down the house in a way that the soldier stricken by some dread fever and restored to health can never hope to emulate. The hundreds of thousands who through the sanitarian have never been ill at all make no impression upon the public; their sound health is taken for granted: it is an evidence of their good physique; they are to be congratulated, not the physicians who, controlling their surroundings, have saved them from illness.

This brings me to my point. The great, the outstanding feature of the War has been the triumph of preventive medicine. It is that triumph, and that triumph alone, that has made possible our eventual success.

For look at the matter dispassionately. While a grateful country owes to the sick or wounded soldier every care, each hospital case weakens the army, not merely by the loss of an individual from the front line, but by the diversion of others from active soldiering to purposes of transport, orderly work and administration services in ambulance, hospital, hospital trains and so on. Throughout the centuries campaign after campaign has been brought to

nothing or to an end by pestilence. Not le "général Fevrier" but General Le Fièvre has been the great leader of the hosts of death and the ultimate victor. Had our sickness and death rolls been what they were at the beginning of the century, in the Boer War, the results of this campaign would have been very different.

You will understand, therefore, why it is that in attempting this review I place first what I may term Preventive Pathology—the research into the cause of disease, which must precede the scientific application of methods of prevention, based upon these researches and their outcome. Let me give you a few outstanding examples of what has been accomplished.

The Continued Fevers

To-day we all speak glibly of typhoid fever and even of para-typhoid A and para-typhoid B, of typhus, relapsing fever, and malaria—so glibly that it is difficult to realize that the sure differentiation and recognition of these distinct diseases has occurred during the lifetime of some here present. Well marked cases of malaria had, it is true, been distinguished clinically for some generations, by the shivering and hot stages of the ague and the swollen spleen or "ague cake". But until our generation there was no means of making a sure diagnosis, and in the war between the North and the South in the States in the "sixties", and in the Boer war only a score of years ago, it was impossible to determine whether an important group of cases were either typhoid or malaria, or both, and they were described in the returns quite mistakenly as typho-malaria. It has been through medical research in our generation that a sure diagnosis has been made possible.

When on the one hand Laveran, the great French pharmacist and parasitologist discovered the organism of malaria in the blood, and on the other Eberth and Gaffky showed how to isolate and recognize the organism of typhoid fever, and Durham, Gruber, and Widal showed how the blood of a typhoid fever patient agglutinated the Eberth-Gaffky bacillus, then, when these observations were elevated into routine clinical methods with which every medical officer must be acquainted, then, at last, diagnosis of these diseases became easy. It has been by this routine observation that the para-typhoid fevers have been differentiated from ordinary typhoid, by the routine use of the microscope in the clinical laboratory that cases of relapsing fever can be made out, and by clinical study and negative laboratory findings that cases of typhus are differentiated from the other fevers.

It is these so-called continued fevers that have been the great bane of the armies of the past. Let us see what has happened in this war.

Typhoid Fever

Let us first take enteric or typhoid fever. In South Africa, but twenty years ago, with a total force of something over half a million men, 129·9 out of every thousand men were admitted to hospital with the diagnosis of enteric, as compared with 47·95 admitted with wounds. In other words, of our British troops one man out of every eight went down with typhoid. One quarter of all admissions was from this one disease, and of them 18·6 out of every 1,000 died, as compared with 2·9 who died of their wounds and 9·59 killed in action. Or: twice as many died of typhoid as were killed in action, and six times as many as died from the result of wounds.

With these figures let me compare those of the present war. I select those of the Canadian overseas forces, and that because in the first place they are the more easily available to me. These are, I gather, better than those for the British forces as a whole, and that because Canada showed a greater sympathy for the well-being of her troops as a whole, and no misplaced sympathy for the stupid conscientious objector. If a man volunteered to fight but objected to inoculation, his services for overseas were declined. He was not allowed to endanger the health of his comrades. It is interesting to note that one battalion alone, the first to cross, and that before routine inoculation against typhoid was fully established, was only inoculated in part, and that battalion afforded many more cases than any other. I owe the figures to my chief, General G. LaF. Foster, C.A.M.C., and more particularly to Lieutenant-Colonel F. G. Bell, C.A.M.C., A.D.M.S., in charge of Hospitalization.

In the second place the two sets of figures are well adapted for comparison. The numbers engaged are roughly equal, 548,237 being the number engaged in the Boer War, 420,000 odd the number of Canadian troops who came overseas. The Boer War lasted thirty-one months; the first Canadian contingent arrived in England in October, 1914, and thus the period of exposure was forty-nine months.

Compared with the 59,864 admissions to hospital with typhoid in South Africa, there were four hundred and twelve Canadian

admissions for this disease. In place of 8,248 deaths (excluding officers) there have been altogether (including officers) fourteen.

Among the ten thousand odd Canadian officers, the majority of whom were between eighteen and thirty years of age—*i.e.* were at the most susceptible period of their life—there was not a single death.

I owe to the courtesy of Major-General Sir Thomas Goodwin, D.G.A.M.S., and to Sir William Leishman the following interesting data. Among the Imperial troops, steadily through the war the number of those who submitted themselves to inoculation had increased, until now no less than 97 per cent. have been thus protected. Although it is true that some 11 per cent. of these have not had reinoculation during the past twelve months, notwithstanding the number of admissions to hospital from enteric fever has been reduced to the extraordinarily low figure of 1·5 per thousand, (as compared with 1 per thousand among the Canadians), and as regards the tens of thousands of officers, there was only one death in 1916 and one in 1917. As regards the inoculated and the uninoculated, roughly in proportion to their numbers there were ten times as many uninoculated admitted to hospital as inoculated.

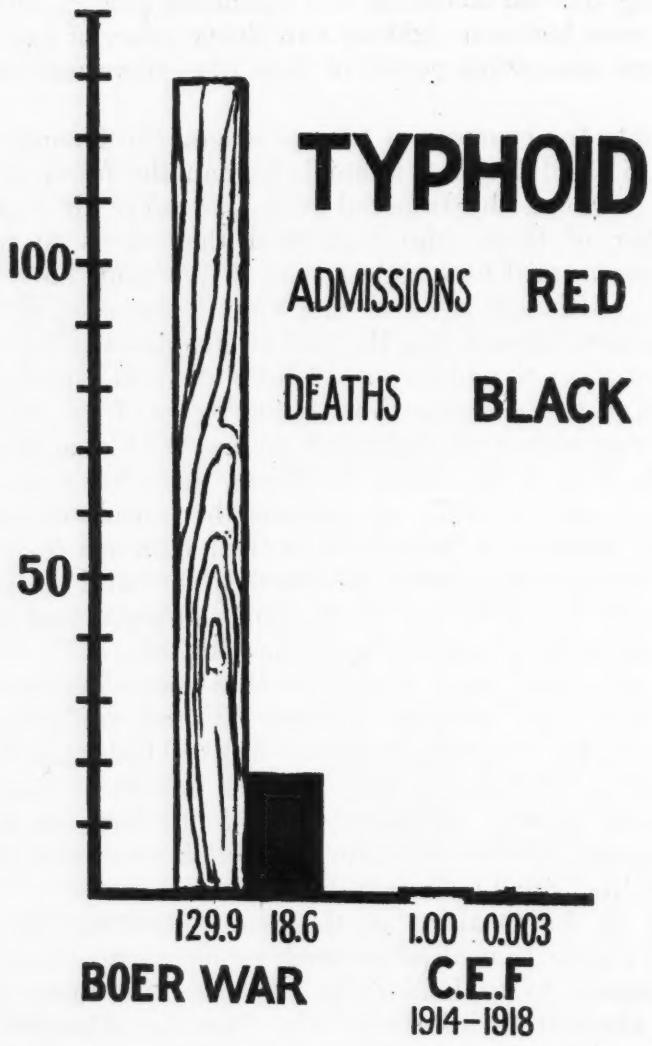
With all due deference to the army surgeons and their work they can show no triumph comparable with this.

Had the same ratio of enteric cases been maintained as in the Boer War, our Canadian Director General would have had to provide seven more General Hospitals of 1,040 beds each throughout the war, some two hundred more medical officers and five hundred more nursing sisters. Imagine what would have been the corresponding additional demand for the British Army with its millions in place of the Canadian hundred thousands.

What is the meaning of these most striking facts? They mean that thanks to medical research we have learnt how to render troops immune to typhoid fever. It does not mean that they were not exposed to infection. Far from it. Flanders with its sodden countryside and stagnant waterways everywhere was rife with the disease; there were 2,000 deaths from typhoid that first winter among the inhabitants among whom our troops were quartered. The German and the French troops not properly inoculated, or uninoculated, suffered heavily until they too learnt the lesson and followed our methods, and we owe our protection very largely to the work of the R.A.M.C.

An able Russian working in India, Dr. Haffkine, had shown that protection could be given against cholera by inoculating individuals

TABLE 1*



with killed cultures of the cholera spirillum. At the time of the Boer War, Sir Almroth Wright, then Professor of Pathology at the Army Medical College at Netley, elaborated a similar typhoid vaccine, and obtained encouraging but not wholly satisfactory results. It was left to his successor Colonel, now General, Sir William Leishman to improve Sir Almroth's methods, and elaborate

* For this and the other diagrams illustrating this address I am indebted to my friend, Captain R. G. Matthews, C.A.M.C.

a vaccine and technique of administration that was thoroughly efficient, so effective that long months before the war it was adopted for the United States Army in which inoculations were made obligatory. Fortunately for Canada in the spring before the war, and at the suggestion of the late Director General, Colonel, now General Carleton Jones, Sir William Leishman had visited Canada, had lectured and demonstrated his methods and had so convinced those in authority that the enforcement of inoculation for all overseas troops was an easy task.

When cases of the para-typhoid diseases showed themselves, by giving combined inoculations of killed cultures of all three specific organisms our troops were protected during the course of the war against typhoid, para-typhoid A and para-typhoid B. This combined inoculation if I mistake not was first started in the Army at the instigation of my colleague, Major L. J. Rhea, C.A.M.C. among the Montreal and Quebec troops early in 1915.

Typhus. Equally great has been the triumph over another of the great war pestilences. By good fortune coupled with good sanitation and good feeding this did not affect our own troops, but it exacted a terrible toll from our brave allies, the Serbs, after they had repulsed the Austrians and gained possession once again, for a time, of their devastated country. War, pestilence and famine coming together mean typhus, accompanied often by relapsing fever. The researches more particularly of Ricketts, the American, who fell a victim to the disease, upon "tabardillo" or Mexican typhus, and of Dutton and Todd* upon an African relapsing fever indicated very strongly that these two diseases are conveyed from individual to individual by body parasites, and, as our troops learned from bitter personal experience, prominent among these is the body louse. When the disease was at its height the Serbians appealed to the British Government for medical help, and the War office sent a commission under Colonel, now General, William Hunter. It is a most fascinating story: how army and people placed themselves unreservedly under Hunter's control, how, acting in accordance with these indications, Hunter disinfected —deloused—a whole people, stopped railway travel for a time so that the infected might not mingle with the disinfected, until the whole country had been treated: how he converted railway vans into simple and effective disinfecting chambers, how he steam-heated all the clothing and bedding, and how in a few weeks the epidemic was effectively arrested.

* Major J. L. Todd, C.A.M.C.

We did not employ equally drastic methods in France, and as a consequence until the last few months it was only certain Divisions that were thorough in their methods and like the Guards and the Canadians (under General Ross, D.M.S.) were effectively deloused.

Tetanus. Next to report another victory:

When Pasteur was making his classical experiments upon anthrax in cattle and was engaged in demonstrating—just about the same time as Darwin was writing his book upon the earth worm—that these worms convey the spores of the anthrax bacillus from the bodies of infected animals buried in the ground up to the surface (thereby explaining how years later other animals became infected), he noted that while some of the rabbits inoculated under the skin with worm casts died of anthrax, others died of tetanus. Evidently the germs of this disease existed in field and garden soil. It was left to Nicolaier, in Germany, to recognize the presence of the characteristic drumstick bacilli—bacilli with a spherical spore at one end, and to the great Japanese bacteriologist, Kitasato, to obtain these bacilli in pure culture, and with the pure cultures to reproduce the disease in the lower animals.

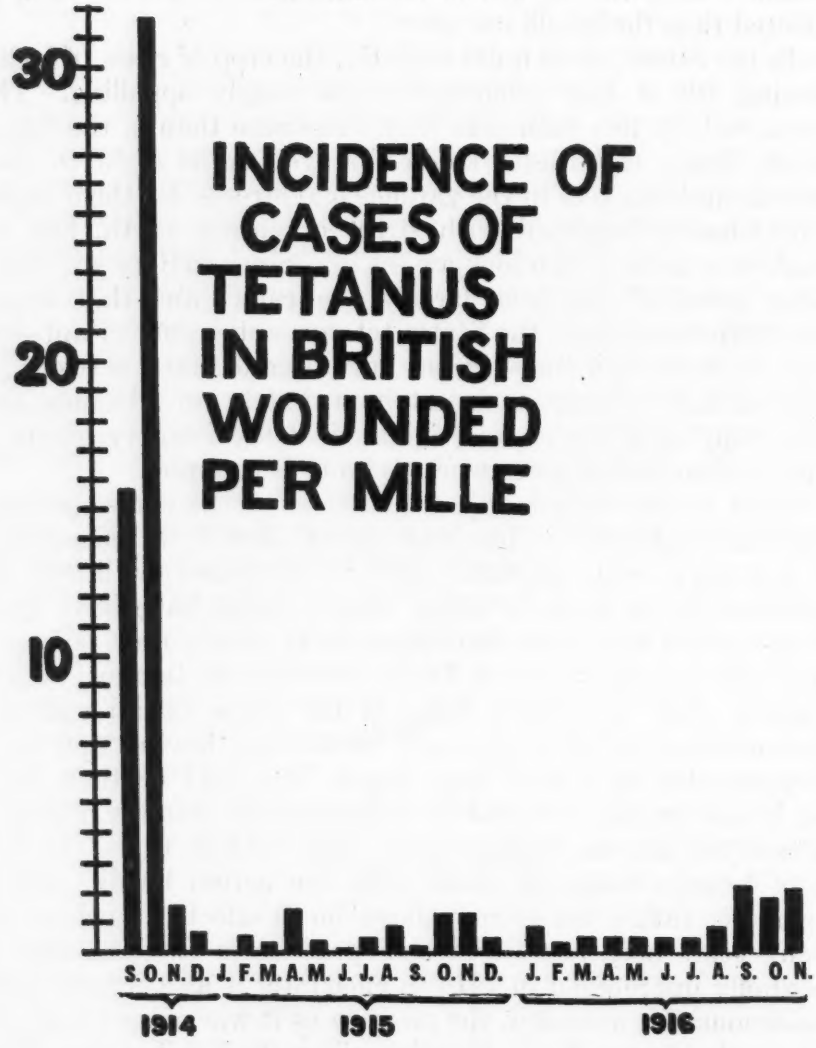
They are remarkable bacilli. Pasteur was the first to show that there exist microbes which can live and multiply in the absence of air and free oxygen, a state of affairs which was thought unbelievable, oxygen being regarded as necessary for life. So it is, but not necessarily free oxygen as it is in the air. These "anærobes" prefer to obtain what oxygen they want by taking it up in a combined form from their foodstuffs, from sugars, for example, and proteins. The tetanus bacilli are anærobes; as a consequence they will not grow in surface wounds. They need deep wounds such as those made by projectiles, or wounds with pockets. As to these pockets and how they help the bacillus to grow, Sir Almroth Wright, working for the Medical Research Committee, has made some exquisite observations during the war. It was the leading American bacteriologist, Dr. Theobald Smith of Boston, who first observed that anærobes could be made to grow under not strictly airless conditions. He showed that if a small piece of fresh meat, or liver or kidney be dropped into a tube of broth exposed to the air, and this is then inoculated with the bacilli, they grow in and upon the meat. Wright showed that the same growth occurred if one took a fine capillary tube, filled this with broth containing the bacilli and dropped it into an ordinary large tube of air-containing broth. Confined in the capillary tube to which the oxygen from the surrounding broth could not gain free

access, the bacilli multiplied freely. Evidently the dead tissue of wounds fixes the oxygen in its immediate neighbourhood, and protected thus the bacilli can grow.

In the States, until quite recently, the crop of cases of lockjaw following 4th of July celebrations was simply appalling. There were more lives lost each year from this cause than in the Spanish Armada War. Countless "kiddies" stayed up at night to set off fireworks and crackers in the gardens and streets, let them explode in their hands begrimed with street or garden earth, and sure enough in a week or two lockjaw set in. Since 1910 or so "Fourth of July tetanus" has been largely eradicated, and that because everywhere throughout the States tetanus anti-serum or anti-toxin is kept in stock, and the surgeons have been directed in every case of 4th of July wounds to inject immediately an adequate dose, in this copying a procedure originated, if my memory serves me aright, in France in regions where tetanus is common.

What is this antiserum? Well it is of the same nature as diphtheria antitoxin. It has been shown that if we take a horse and beginning with nonfatal, give it progressively larger and larger doses of the broth in which tetanus bacilli have been grown and into which they have discharged their most potent poisons or toxins, we can render these horses immune to tetanus, so that eventually they will stand doses of the living bacilli and their toxins sufficient to kill a thousand horses, and having thus raised their immunity to a very high degree, the fluid of their blood (their blood serum), is found to neutralize the tetanus poison, so that injected into an animal along with several times the fatal dose of tetanus toxin, or along with the actual bacilli, nothing happens—or rather the animal shows no ill effects. Lockjaw has for long years been so rare in civil practice in England that we were wholly unprepared in 1914 to encounter it as a frequent condition among the wounded, the more so as it was almost unknown in the South African War. But the soil on the Veldt is very different from that in the highly cultivated and highly manured districts of France. When in 1914 our troops got down to the Marne, and still more in the Aisne area, they fought over ground that had been cultivated for long generations. Presently case after case of those wounded in this area and transferred to the general hospitals on the French seaboard, or to England, manifested this terrible and most fatal complication. I should explain that it is days and often weeks before it shows itself, and mercifully this long incubation period gives us our opportunity to protect the in-

TABLE II.



dividual. We had not expected it and we were unprepared. But the remedy was obvious, and was applied as soon as ever it could be secured in sufficient amounts.* Naturally it takes some little time to prepare, for it needs several weeks to render horses highly immune; but once the serum became available, instructions were given that every wounded man should be inoculated against tetanus. Here are the results which I have abstracted from a paper by General

* The Province of Ontario and Toronto University, it deserves note, came here to the help of Britain and supplied large amounts of antitoxin.

Sir David Bruce, chairman of the committee appointed to investigate this matter of tetanus and its treatment. At first I should explain, the amount of the serum at our disposal being by no means excessive, too small a number of units were injected into each man, and occasionally cases occurred in which, despite inoculation, the disease showed itself. Eventually an increased dose was made official, and from that time onwards tetanus was practically obliterated from among our troops.*

I should mention that the members of Sir David Bruce's committee found another very possible cause of failure in a certain number of cases. They discovered that just as there are typhoid and para-typhoid organisms, so there exist in nature at least four distinct strains of the tetanus bacillus, so that the serum obtained from horses inoculated against one strain only of the bacillus would not be as effective in the cases of those infected with another strain as it is in those infected with the homologous strain.

Spotted fever; cerebrospinal meningitis. Epidemics of spotted fever have developed at irregular intervals in Europe and North America all through the last century, epidemics that have struck terror, so few of those attacked surviving. Mostly it is young children that have been the victims, but it is not a little remarkable that numerous barrack epidemics have been also recorded. Since the century opened there have been serious epidemics in New York and the great cities of the United States, spreading into Canada, in the British Isles there was in 1906 to 1908 a similar epidemic with heavy death roll in Belfast, spreading to Glasgow; another at Nottingham in 1910, while ever since then scattered cases and groups of cases have been recorded in Great Britain, until in 1912 cerebro-spinal meningitis was made a compulsorily notifiable disease.

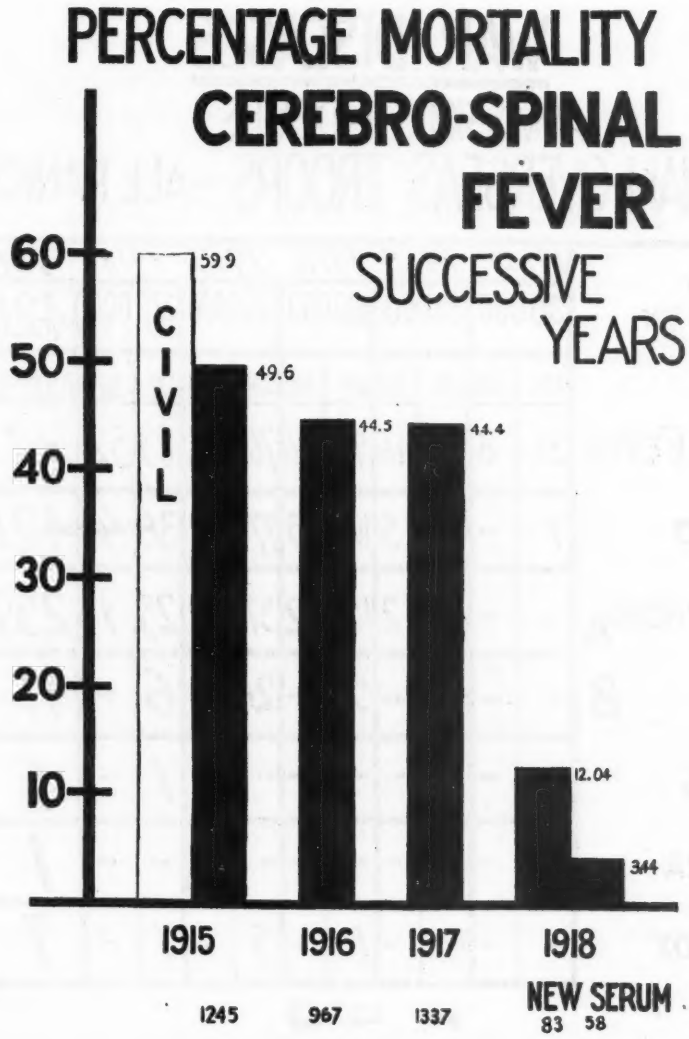
Then through the rain-swept winter of 1914-15 the disease made itself felt in the Expeditionary Force. There had been some dozen cases recorded among the civil population of England and Wales in the first three weeks of October, 1914. The first military case was reported in the fourth week of that month. Here, as a Canadian, let me say that there is no evidence that the Canadian troops are responsible for the subsequent epidemic, as again absolutely none that they introduced a specially malignant form of the disease. It is true that cases had occurred at the

* From the first No. 3 Canadian General Hospital employed double the official dose with the result that not a single case occurred in the thousands of surgical cases treated.

Valcartier Camp, and three cases on shipboard when the first contingent crossed to England; the first case among the Canadians on Salisbury Plain was discovered upon October 18th, the first among British troops in the same week, but no evidence has been adduced to show any relationship between this first British military case and the Canadians. In all, between October 18th and the following May 1st, fifty cases occurred among 30,000 Canadians, with thirty-six deaths.

The war has taught us salutary lessons regarding the disease, notably that it follows overcrowding and bad ventilation. Reduce the number of men in a hut and see that the air is kept fresh, and the cases fall off rapidly. Much had been hoped from the employment of the Rockfeller antiserum. This had been elaborated during the New York epidemic and had distinctly good effects in America as also in Belfast eight years previously, but the serum provided from America in 1914 and 1915 appeared to be absolutely without effect. Its failure led to a careful investigation by the Army authorities at Millbank, which took two main directions. In France attention had already been called to the existence of meningococci proper and parameningococci, and Major Ellis of the Canadian Army made a careful study of the bacteriology of these army cases, thereby isolating three allied but distinct strains of meningococci. Simultaneously Major, now Colonel, Gordon at Millbank isolated four, and these are now generally recognized. Following upon this, Colonel Gordon and his colleagues have developed powerful antiserums both monovalent and polyvalent (protecting against all the strains), and with progressive improvements in these serums the mortality from the disease has been reduced to a very striking degree. As a matter of fact, Colonel Gordon and Major Hine have prepared a serum so potent that whereas in the first two years of the war the mortality from the disease was 50 per cent. and over, now in the last eighty-three unselected military cases it has been reduced to 12 per cent., or if we deduct the fifteen of these cases in which experience has shown that the treatment was administered too late to be operative, to 3·44 per cent. By isolation of carriers, improved camp sanitation, and the employment of improved antitoxins or antiserums what threatened to be a widespread epidemic has been prevented from spreading and has been brought well under control. So much for the outstanding triumphs, nor, to give you an impression of how great was our conquest over infectious disease—at least at the main seat of war in France and Flanders—do I think that

TABLE III.



I can do better than give you this analysis of the incidence of the main infections in the Canadian Expeditionary Force.

It would be wrong, however, to give you a sketch that was all high lights; to give these their proper value the more sombre background of failures and partial failures must at least be indicated. There are other infections which, notwithstanding abundant and most conscientious laboratory investigatious we have been unable to arrest. Judging from certain letters in the daily press the ordinary public does not realize the difficulties of bac-

TABLE IV.

WAR DISEASES

ADMISSIONS AND DEATHS

CANADIAN OVERSEAS TROOPS — ALL RANKS —

APPROX. TOTALS ALL RANKS Oct 31st	1914		1915		1916		1917		1918		Total	
	30.000		85.000		180.000		250.000		275.000		420.000	
	ADM	DIED	ADM	DIED	ADM	DIED	ADM	DIED	ADM	DIED	ADMITTED	DIED
C-SP. FEVER	21	8	94	46	93	46	76	46	83	52	367	198
TYPHOID	9	—	136	5	163	3	77	2	36	4	421	14
PARATYPHOID A	—	—	38	2	159	2	37	2	25	1	259	7
do B	—	—	2	—	57	—	26	—	6	—	91	—
TYPHUS	—	—	—	—	—	—	—	—	1	—	1	—
CHOLERA	—	—	1	—	—	—	—	—	—	—	1	—
SMALLPOX	—	—	—	—	1	—	5	—	1	—	7	—

— = 0

teriological research, the patient way in which test after test has to be made, one man contributing this little advance, another man another, until the problem is narrowed down until we can predicate the nature of the causative organism, and can then take the proper steps to isolate and discover the means of cultivating that organism and determine its properties and habits, and can devise the proper means of arresting its growth and eradicating it. All this means, too frequently, months and sometimes years of unremitting labour. Influenza, for example, came upon us

suddenly, and, despite intense laboratory activity in all countries, the end of the War has arrived and we are still uncertain as to the causative organism. Tens of thousands of cases of bacillary dysentery occurred just along one front in the Gallipoli campaign. Indeed, we may with considerable justice ascribe the failure of that campaign to the depletion in the ranks from dysentery. Malaria, which, as Sir James Barrett has recently pointed out, caused the failure of Mark Antony's Egyptian campaign, which came to the rescue of Saladin and the defeat of Richard Coeur de Lion and the Crusader and gave Napoleon his first defeat at Acre at the hands of a junior British officer, came near to rendering futile both the Salonica and the Palestine campaigns.

Nevertheless, the knowledge of the natural history of malaria which we had gained from the remarkable studies of Laveran in Algiers, of Sir Ronald Ross in India, of Celli in Italy, and of W. G. MacCallum in Canada and the States, did help us. But for that knowledge we could not have carried through the campaigns in Salonica, East Africa, Mesopotamia, and Palestine—in regions, that is, in which we had not been able to kill off the anopheline mosquito. In war we cannot tuck the soldier into bed at sundown within mosquito nets; nor can we arrange that his activities be only upon high lands away from the breeding places of these insects in swamps and stagnant water. The most brilliant exploit of the whole war, the rapid capture of Upper Palestine and Damascus, really depended upon a knowledge of the natural history of the disease. There is a definite period of several days incubation before a man bitten by an infected mosquito develops the disease, and General Allenby rushed his troops through the malaria infested districts of Palestine at such a rate that his men overcame the Turks before in their turn they were overcome by malaria. But for these tactics this last crusade would have had the same fate as the earlier.

Not did we work out the nature of trench fever until the War was almost over. The same is largely true regarding gas gangrene and its arrest. That we did not overcome the bane of all armies, venereal disease, was not, however, due to want of scientific knowledge, but to the hesitancy of those in authority and their fear of putting in motion those procedures which would have kept these foul diseases under.

After all, the fight against the infections is very like that against the Hun. Our defences in one area have been so well placed and so well constructed as to keep the enemy at bay with

ease; in another area, as around Ypres, our protection has been incomplete and the situation so unfavourable that we have only held on with enormous losses; at yet another point along the line a sudden attack for which we were not prepared may have led to rapid retirement and loss of ground, as on the Somme last spring. Of such a nature was the recent epidemic of influenza which, happily, like the German advance, wore itself out, but for a time led to a terrible mortality. The position regarding the venereal diseases may be likened to the Gallipoli campaign—terribly costly, with unnecessary failure. A fuller knowledge of psychology and a fuller belief in the efficiency of preventive medicine would have converted failure into success. The methods of preventing these diseases and of reducing their ravages to inconsiderable proportions were there; only we were afraid to act. We thought the opposition would be too great.

Yet surveying our operations in general in our fight against disease, as against the Hun, we have come out well, and looking back I am inclined to think that three factors have especially contributed.

(1). It is to the credit of the late Director-General, Sir Alfred Keogh, that when he with his South African experience assumed office his first act was to place sanitary science in the forefront in the training of the army medical officer. He developed courses at Aldershot, not only for the officers of his own corps, but also for regular officers at the Staff College, and for N.C.O.'s and men in the camp. Thus when the War came upon us the commanding officers of units and the sergeants and men of the little old Army had an intelligent knowledge of the principles of hygiene and preventive medicine; as a body they received willingly the recommendations of their medical officers and they co-operated loyally. (2). Then, too, in the Army Medical Corps itself, medical research was appreciated. I have already mentioned members of that body who stand out among the foremost pathologists and bacteriologists of our generation: Sir Almroth Wright, Sir David Bruce, Sir R. Leishman and Colonel Gordon. And (3), a most potent influence during the War has been the whole-hearted encouragement and help of the Medical Research Committee, which, under Mr. Lloyd George's Insurance Act was granted from National Insurance moneys a sum approximating £60,000 a year which, with a wise patriotism, was with the war diverted to the advance of military medicine and research. Time forbids that I detail the many ways in which this Committee, with its energetic secretary,

Sir Walter Fletcher, has placed its resources at the disposal of those, in and out of the Army, wishful to work out the medical problems of the war.

And this, let me add, not only for prevention but for treatment. Remembering my title I cannot close without calling your attention to, at least, outstanding advance in medical treatment. I have already referred to the extraordinarily good results from the development of a national orthopædic surgery under the stimulating influence of Sir Robert Jones, whom we may without hesitation claim as the greatest military surgeon of this War—the Ambrose Paré of the twentieth century. A triumph equally great has been that over a condition so uncommon in previous wars as to be scarce noted, but one which in this war assumed for a time very serious proportions. I refer to the loss of self-control brought about by the intensity and gravity of the artillery warfare—the noise, the concussion, the frightfulness, the obvious impotency of the soldier whether in the trenches or in the open when exposed to shells which in size, explosive power and number exceeded anything even dreamt of in previous campaigns.

In the first two years of the War little could be accomplished to mitigate the profound breakdown, mental, sensory and motor of the piteous sufferers from "shell-shock"—men rendered deaf, or dumb, or blind, or unable to walk from tremors and paralysis, and suffering from oft-repeated and terrifying dreams. Thanks to the studies of the neurologists, cases of malingering, of mere concussion and of organic nerve disease were distinguished from cases of shell-shock proper. At first these cases were sent home to England, and here, not properly cared for and treated, they went from bad to worse. Next, it was noted that these cases in the male were of much the same order as hysteria in the female, that they responded to suggestion of various orders and modes of application, and this the more readily, the sooner after the onset of the conditions of shock. And at the beginning of the third year of the War, it was found, here following our allies, the French, that the best results were obtained, not by posting these cases to base hospitals, and over the channel, but by taking them in hand forthwith at special hospitals just behind the line.

It is not possible at the moment to give precise figures, but I believe I do not exaggerate when I say that during the first two years of the war 30,000 cases labelled as "Shell Shock" were on the average returned to England, and, to repeat, these at first were sent to no special hospitals, received no special treatment and tended to

get worse rather than better. It was at the end of 1916 that the British authorities determined to establish a "Shell Shock" centre in each army area. The returns from these are not complete and here again I have to rely upon Canadian figures. That for the —— Army was placed under the charge of Captain F. Dillon, R.A.M.C., and in the middle of 1917 was transferred to No. 3 Canadian Stationary Hospital in the historic old fortress at Doullens, rendered yet more historic during the War as being the object of a wholly unprovoked and unforgivable night attack by German aeroplanes in May, 1918, with the death of many patients, medical officers, nursing sisters and orderlies.

By collecting the cases together, reasoning with, encouraging and persuading them, and above all by the force of example—by the patients seeing daily those around them recovering their good spirits and faculties, an extraordinary change was brought about. At this hospital only a relatively inconsiderable minority was found so affected that they had to be returned to England; according to the report of the O.C. of the hospital (Lieutenant-Colonel Reason, D.S.O., C.A.M.C.), 75 per cent. of the cases at Doullens were returned to duty, with very few relapses or recurrent cases. Others have been given work along the lines of communication. As a result of this system in place of thirty thousand, only some two thousand were in the last year of the War returned to England.

Not wholly unassociated with "Shell Shock" is the condition known as irritable or "Soldier's Heart". This condition had been studied in the American Civil War by Da Costa and since then by Sir Clifford Albutt, Sir William Osler, Sir James Mackenzie, and others with at first no clear results. It was left to the Medical Research Committee at the instigation of Mackenzie, Osler, and Allbutt to offer a special hospital at Hampstead, and later, when this was too small, at Colchester, for the particular study of heart conditions in the soldier under the more immediate care of a staff of highly trained expert physicians with Dr. Thomas Lewis at the head,* and the above mentioned three as consultants. Such progress has been made in the diagnosis and treatment of these cases that, not to go into detail, it may be said that fifty thousand men have in one year been saved to the Army, instead of being returned to civil life as hopeless and incurable invalids. This one investigation in one year saved to the country a sum more

* Two of the leading members of their staff, Major Meakins and Captain Cotton, were officers of the C.A.M.C.

than equivalent to the total upkeep for the year of the Medical Research Committee.

It must be recalled that this was one only of the numerous activities fostered by that Committee. Time forbids that I should wholly enter into the good work of that body. Did an emergency arise they forthwith brought together a group of those most interested and most qualified to advise regarding the problem to be solved. Instead of each worker remaining isolated in his own laboratory and pursuing his own line of work and ideas irrespective of the work of others these men came together, freely discussed each others views and suggestions, advised regarding the best methods of attacking the problem, suggested the best men to be entrusted with investigations, received their reports, discussed their results, called for further evidence, analyzed and published reports regarding progress and sent out prospectuses for collective investigations throughout the country and the Army. Some workers they have supported for their whole time, others they have aided by grants and instruments.

I can but name some of the many directions in which the Medical Research Committee has been of service: The publication of a monthly "Medical Supplement" giving abstracts of all important papers the world over upon war medicine and surgery, and the collection of material for a medical museum of the War, as again for a medical history of the War; the provision of charts, tables and returns for the orderly study of various notes of cases: provision, laboratory and otherwise, for the co-operative study of such conditions as cerebro-spinal fever, influenza, trench fever, the dysenteries, protozoal diseases, and parasites: as again of the food and dietaries of munition workers, the hygiene of the factory and industrial fatigue: standardization and preparation of drugs like salvarsan: development of new drugs and antiseptics (emetin-bismuthous-iodide, eusol, chloramine-T, acriflavine): of the best methods for the bacteriological diagnosis of disease: the study of wound infections: transfusion of blood: results of gassing: the physiology of airmen and effects of high altitudes. These are only some of the studies aided by the Committee.

In this way a wonderful and effective amount of good work has been accomplished for the benefit of the sick and wounded, and for the improved health of the Army and indeed of the Nation. It is a noble record.

We ended the War with the realization of what research and team work can accomplish for the public good, and with a con-

fidence that the medical profession can surely bring about a yet greater revolution in the future for the benefit and the well-being of our people. Thanks to the War that profession has gained the confidence of the people. An era is before us in which the health of our people must be the foremost consideration of the Government, and in which the medical man will be given a position as a responsible leader such as he has never possessed.

PROFESSOR U. CAPRI, Lugano, Switzerland, is anxious to re-establish the International Association of those interested in the usefulness and success of "Artificial Pneumothorax" in certain cases of phthisis. He proposes to issue a Journal to be known as *Pneumothorax Therapeutique*. Communications in regard to it may be addressed either to Dr. Adolphus Knopf, New York, or to Professor Capri in Lugano.

A PLEA FOR BETTER OBSTETRICS

By Robert Ferguson, B.A., M.D.

Professor of Obstetrics and Gynæcology, Western University, London, Ontario.

PREVALENCE of inefficiency in obstetrics. Am I within the facts in claiming that 30 per cent. of the work of the gynæcologist is necessitated by bad obstetrics? The commonest pelvic disability met with in gynæcological practice, viz.: prolapse of the pelvic viscera, is due almost wholly to labour trauma, and is largely preventable. According to the figures of the Census Bureau, motherhood is a hazardous occupation in the United States, and doubtless the showing in Canada is not one whit better. In the United States, in 1916, sixteen thousand mothers lost their lives from childbirth, and in 1918, the number had increased to more than twenty-three thousand. Not only is motherhood hazardous from the viewpoint of the mother but it is even more perilous to the child. Snow's statistics based on one and one-half million births show that two hundred and fifty thousand infants are lost annually in the United States in the first four weeks of life. This fearful wastage of human life could be enormously reduced by better prenatal care and the more skilful and painstaking management of labour.

Training of students in obstetric practice. Improvement must begin with the colleges. Obstetrics should occupy a more important place in the curricula. The difficulty in obtaining ample clinical material renders the course in obstetrics lacking in practical experience. There is no other department of practice in which it is so essential as in obstetrics that the student shall "learn to do by doing." He should be familiar especially with diagnosis. How many graduates begin the practice of medicine with any adequate knowledge of antepartum fœtometry, pelvimetry, or of the information to be gained by abdominal palpation?

Inadequacy of obstetric experience without thorough college training. Experience gained in the early years of practice is often acquired at the risk of the patient. I doubt if half the practitioners

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clinically differentiate occiput anterior, and occiput posterior positions, single and twin pregnancy, or vertex and breech presentations. Fortunately nature's resources carry the parturient safely through her labour in the majority of cases without the assistance of the accoucher. Unfortunately, however, the average medical attendant presumes to trust to nature so far that when he encounters some abnormal condition he is incompetent to recognize or cope with the difficulty, and not infrequently the result is disastrous. Unless the practitioner has acquired in his student course, a knowledge of the mechanism of labour in its various presentations and positions, normal and abnormal, he will never master its technique in the busy routine of actual practice and consequently he can never be relied upon to give competent and expert service in the emergencies and difficulties of obstetric practice.

The commoner defects of obstetric practice. To be more specific, I will refer to the commoner examples of mal-practice in obstetrics.

Preliminary examination. Not uncommonly preliminary vaginal examination with the ungloved finger or hand is the starting point of an infection. A physician is called to a case unexpectedly or without knowledge of its nature, and he chances an examination without gloves or taking the time to prepare himself or the patient for the examination. A vaginal examination should never be made within seventy-two hours of labour except under strictly antiseptic precaustions.

Meddlesome midwifery. Meddlesome midwifery is often responsible for untoward results. The busy practitioner is sometimes impatient to terminate labour and save time. Provided the preliminary examination satisfies the accoucher that the case is normal, a primipara need not be seen again until the anus gapes from pressure of the presenting parts. Gaping of the anus is the positive sign that the services of the physician are required, and the nurse should be instructed to send for him then if not before. This sign is earlier and more definite than the apparent bulging of the labia incidental to straining, which straining is often mistaken by the nurse for bulging of the labia long before the presenting part has reached the pelvic floor. The impinging of the head or presenting part upon the labia is best detected by palpation when a pain is on. If the doctor is not summoned in the case of a primipara, until this stage is reached, the long and useless waiting is avoided, and there is less temptation to undue interference incidental to prolonged waiting in the case of a primipara.

Management of prolonged labour. "Watchful waiting" is a

good watchword for the lying-in room, but its too general adoption is attended with disastrous consequences. The reputed frequency with which an occiput posterior becomes an occiput anterior in the late second stage, argues for noninterference. I question, however, whether this conversion takes place as often as many authors claim. Wrong diagnosis rather than late rotation may be the real explanation of the apparent frequency of late rotation. Occiput posterior in a primipara is a formidable difficulty as a rule. If the diagnosis of occiput posterior is made before the head is engaged it should if possible be corrected to avoid the inevitable deep laceration with its probable untoward sequelæ.

The abuse of pituitrin. The indiscriminate use of pituitrin is becoming an abuse. However serviceable it may be in suitable cases, it has its limitations. Its effect lasts only an hour, consequently it should not be given in the first stage of labour. Ergot on the other hand produces uterine contractions for four hours after administration and is therefore a better preparation for the prevention of post-partum hæmorrhage. Pituitrin in the case of a primipara should never be used unless one is sure that there is no obstruction or mechanical obstacles to the birth, otherwise the pains which it imposes are exhausting and yet futile. In the case of a multipara there is less risk of encountering such an obstacle. In both cases any mal-position of the child which renders delivery difficult or impossible, must be corrected before it is administered.

Prolonged anæsthesia. Prolonged or deep anæsthesia predisposes to post-partum hæmorrhage. Anæsthesia is serviceable only in the second stage, and in primiparæ only in the advanced second stage, to relieve severe pains and to guard against laceration by relaxing the musculature of the vaginal tract. Its prolonged administration is attended with danger of asphyxia of child.

Episotomy. Severe laceration of the perineum especially in primiparæ, can frequently be avoided by resorting to episotomy. It is not necessary to make bilateral incisions. The incision should be made at the posterior extremity of the oblique diameter, a continuation thereof, and on the side at which the occiput or forehead impinges. It should be one inch or one and one-quarter inches in length, and should extend deep enough into the muscular structures to materially increase the capacity of the outlet. The bleeding is easily controlled, the incision is a clean one and readily repaired. It should not be made in the mid-posterior line, as the tension is not so great there, and there is danger of its extending into the rectal sphincter. This simple device will often prevent a severe irregular laceration. In selected cases it is good obstetrics.

Preliminary preparation of the patient. In domestic practice one thing should be insisted on, and that is thorough evacuation of the colon preparatory to labour by means of a copious enema. The patient and nurse will often assure you that the bowels have been thoroughly evacuated without an enema. Insist on an enema nevertheless or in 90 per cent. of cases discharges from the rectum endanger the patient from infection, during the second stage. Doubtless puerperal infection is frequently due to this cause, and being preventable it should never occur from this source. The enema should be given early in labour to allow the intestines time to recover from the peristaltic effects. Further, in the second stage the pressure of the head upon the rectum will interfere with the effectual administration of the enema.

Prenatal supervision. Prenatal supervision and early examination of the patient are important, in fact absolutely essential in the case of a primipara, and abdominal examination should not be delayed beyond the thirtieth week. Between the twenty-eighth and thirty-second week is the most suitable time in case it should be necessary to terminate labour before term. The fœtus is viable at this period, and the size is less than at full term, rendering forced delivery easier than at term.

Every hospital attended by students should have a prenatal clinic. Students attend the clinic in pairs, and under the supervision of the clinician, examine the patient, including the taking of a Wassermann blood specimen. The patient is subsequently visited at her home as required, and given maternity service under the direction of the staff physician, either at home or at the hospital, as preferred. The clinic is of course for staff cases only, who are not able to pay for private services.

I have thus far briefly discussed the commoner defects from my viewpoint in the practice of obstetrics, the correction of which would yield results worth while. I have purposely confined myself to the common place and the practical, rather than the abstruse and the technical, in the hope that the paper might elicit such discussion as would be productive of benefit in a department of medicine that is worthy of more study and attention than is ordinarily given the subject of obstetrics.

On account of time limitation, I have not touched upon the parallel subject of birth injuries to the child, which are scarcely less serious and less prevalent than injuries to the mother herself.

THE TREATMENT OF HÆMORRHAGE IN MEDICAL DISEASES

By A. H. Gordon, M.D.

Lecturer in Medicine, McGill University; Physician to the Montreal General Hospital

THE emergencies which arise in medical, as opposed to surgical diseases, and in which life is threatened, have to do in great part with the loss of blood; and whereas direct methods of arresting bleeding, as by a forceps, or a ligature, or a tourniquet, are not available, and one is largely dependent upon nature's curative powers to prevent death, yet it is thus even more necessary in medicine than in surgery that we should learn as well as may be, the cause and the cure of these internal diseases in which loss of blood occurs.

The emergency is, as a rule, so acute, and the danger frequently so near, that one's views have need to be well crystallized, and the principles of the treatment clearly in mind, so that a correct reaction to the emergency may be well nigh automatic.

Three types of hæmorrhage with which we have to deal are represented by (a) hæmoptysis in pulmonary tuberculosis, (b) hæmatemesis in gastric or duodenal ulcer, and (c) melæna in typhoid fever.

Let us take first the case in which a hæmorrhage has occurred in a gastric or duodenal ulcer. Here the pathological problem is simpler because there is not an acute progressive inflammation at the bottom, as in typhoid, nor a necrotic cavity with indurated walls as in tuberculosis. The bleeding is more like that from a wound of an extremity than in either of the other cases.

Imagine an artery spouting in a deep burn at the bend of the elbow with no ligature or forceps available. A pad, a bandage, a sling and a bed are the first things that come to mind.

The next thing would be a wholesome fear of disturbing that arm for some days, the next to get the burn healed as rapidly as possible.

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May we, *mutatis mutandis*, apply the same means to the stomach ulcer.

The forceps and ligature may or may not be available; this we shall discuss later.

The pad narrows the opening, the bandage slows the stream. These two permit clotting. The sling gives rest to the part and bed quiets the general circulation and lessens the number of heart beats.

There is no internal substitute for the pad and the bandage, but starvation and morphia will imitate the sling, and morphia and bed will slow the blood stream.

The comparison points out the inadequacy of medical measures against hæmorrhage which occur in organs constantly in movement. It is only right then, that our present methods of dealing with these events should be checked by analogous states in the visible parts of the body as well as by a reasonable scepticism and common sense.

Granted then a sudden onset of vomiting of a considerable amount of blood of bright colour, if the patient is lying, let him lie,—"as the tree falleth." There are few occasions in which a hypodermic of a one-sixth or a one-fourth grain of morphia is not indicated—this is the sling.

Undressing him now may forfeit his life. Let him alone.

We can learn nothing of use from a physical examination, and we may do great harm.

He is vomiting blood, that's enough. Give no drugs or food by the mouth. There is no virtue in ice—it becomes cool water when it reaches the stomach.

Tradition says to elevate his feet—with what object?—to bring by gravity blood to the brain and so raise the pressure; but the lower we can keep the pressure, the nearer we imitate the bandage about the arm. It is just here that judgment is most needed. If the pulse keeps fair and the patient is not *in extremis*, he is better left alone, for the lower his blood pressure can be maintained compatible with life, the more likely it is that a sound clot may form at the site of the bleeding. The advice given before answers in most instances, but what shall we do when the bleeding doesn't stop, or when it recurs at frequent intervals. Here we are confronted with a very serious problem. Interference or non-interference is the question to be decided. It may be said that the majority of single large bleedings cease spontaneously, but if recurrence appears after an interval and if the blood count drops, I think it means that we have passed out of the region of safety and operation should

be undertaken, but not undertaken lightly. Observation of surgical intervention for gastric bleeding impresses one with the frequent difficulty in finding the bleeding point, and with the bad prognosis of cases operated upon.

If an artery is found spouting in an ulcer, well and good, but one must even be prepared to see the stomach opened and either no accessible ulcer found, as when it occurs near the cardiac end, or multiple bleeding points may be found which do not lend themselves readily to operative cure.

Before operation is undertaken the patient should be prepared by a transfusion of blood.

To put the matter shortly—single massive hæmorrhages are better treated by rest, starvation and morphia; recurring severe hæmorrhages by operation preceded by transfusion when a skilled and rapid operator is available—when not available, I believe statistics would counsel us to let the patient have his chance by medical means.

Recurring small hæmorrhages demand curative surgical operation in the interval.

Hæmatemesis always suggests ulcer, and in much the largest proportion of cases is associated with ulcer, but I think we must recognize certain types of gastric bleeding not associated with ulcer. There is a form occurring mostly in young people in which hæmorrhage of considerable amount may result from erosion of the mucous membrane, of toxic origin, and the proximate cause may be either appendicitis, cholecystitis or even salpingitis.

The typical history of ulcer is absent and the *x*-ray fails to demonstrate it. It is in cases of this sort that great caution should be used in advising direct surgical means to arrest bleeding, and attention should be directed to the condition of other abdominal organs apart from the stomach.

Varicose veins of the œsophagus are given as a cause of bleeding, and I am sure that this does occur, but I can only say that in my own experience on every occasion in which I suspected this cause, further investigation proved it to be duodenal ulcer. One must, however, keep in mind the gastric hæmorrhage associated with Banti's disease and splenic anæmia in which splenectomy offers a reasonable prospect of relief.

Without going too far afield while dealing with the question of treatment one must lay stress upon the value of a careful history in cases of gastric bleeding. A definite history of painful indigestion with temporary relief after food, and this of considerable duration,

with remissions of several weeks at a time, opens a strong suspicion —and more—of ulcer.

Having then decided that we are dealing with ulcer, what attitude shall we take toward small repeated bleedings, including (*a*) occult blood in the stool, and (*b*), to large hæmorrhages?

I do not think that small bleedings are of themselves an indication for operation, although the continuance of occult blood, or "*a fortiori*" macroscopic blood, strengthens the opinion that the case has become a surgical one, otherwise a conscientious medical régime should be founded upon the whole aspect of the case, and for the same reason advising an operation should be founded upon the general features of the ulcer, rather than upon small bleedings alone.

The massive hæmorrhage comes under another heading.

One large hæmorrhage spells medical treatment for the emergency.

Its recurrence raises a doubt of the advisability of persistence in medical means.

While a third bleeding within a short time practically compels operation as a counsel of despair in nature's ability to bridge the gap. It is in just such cases as these that one recalls the advice of the philosopher to the young man who asked whether he should marry or not. His reply was; "Whichever you do you will regret it."

After recovering from a massive hæmorrhage, if the patient is a good operative risk, one's duty, I think, is to advise operation, but let us also remember that unless the ulcer is destroyed by cauterization, or excised, a considerable percentage of recurrences of bleeding is to be expected.

Following a severe hæmorrhage it would seem rational to give nothing at all by mouth for at least forty-eight hours. Then water in teaspoonful doses.

At the end of seventy-two hours small doses of milk may be added and then gradually advance to a Lenhartz diet.

Even rectal salines are better withheld for the first two days, after which six ounces of 10 per cent. glucose saline may be given at four hourly intervals.

Hæmoptysis may be broadly discussed as a result of pulmonary tuberculosis, for what applies to it from the standpoint of treating an emergency applies also to other causes of lung bleeding, and on the background of a chronic disease which may be activated by the bleeding, or by its treatment, we must treat the event of the moment.

The immediate crisis certainly demands attention, but it is of little profit to save a life from hæmorrhage to have it lost from pneumonia or an acute spreading tuberculosis.

To return to our simile of the bleeding ulcer at the bend of the elbow, let us apply the pad and the bandage and the sling, but with discretion.

Let us treat the subject of blood spitting where we find him. If he is semi-recumbent he will breathe more freely, and he will be kept nearer the fainting line where blood pressure is lowest. Blood frightens most people, but if the doctor is frightened—as he may properly be, he must not show it. The equanimity of the physician, of which the late Master spoke, is the equivalent of a hypodermic of morphia to the patient.

Speaking of morphia, one is always tempted to give it, and usually it is proper to do so, but after a moderate preliminary dose to quiet cough and restlessness, its further administration may kill while it saves, by preventing the normal reaction against drowning the bronchi with infected blood. Babcock and Minor strongly recommend the use of a large dose of atropine by one-thirty-fifth grain.

Far be it from me to sit in the seat of the scorner, but the patient has some rights, and to dose him with ergot, gallic acid, turpentine, sulphuric acid, adrenalin, calcium lactate or amyl nitrate just because we must do something is not giving him physiological rest.

Don't undress him. Don't fuss over him. Don't examine him. Don't talk to him, nor let him talk. Don't give him useless drugs or useless nourishment. If we use an ice bag, put it over his heart to quiet the pulse instead of over the hypothetical break in the blood vessel. See that he has an ample bowl to spit in, and gauzes at hand without his reaching for them, and best of all, if she can be had, a steady minded nurse.

With these things, the statistics are in favour of his recovery, but one is never justified in giving too glowing a prognosis.

If the hæmorrhage is persistent or recurs frequently, the question of pneumothorax certainly arises, but unless the lesion is strictly unilateral—and who can say this—its employment is a gamble, but a justifiable one.

I might cite a recent case—a man with clinical and *x*-ray signs of involvement of an apex had frequent small hæmorrhages and an artificial pneumothorax was induced without trouble. Two days later he had a furious hæmorrhage and died in ten minutes.

At autopsy the apex was rigidly adherent to the chest wall and a cavity an inch in diameter was found, and in it an aneurism the size of a pea, from which the bleeding came.

The diseased upper lobe had not been compressed in the slightest degree.

Following a hæmorrhage the patient should be kept at rest for at least a week and careful observation later made for the development of new signs toward the bases of the lungs.

Hæmorrhage in the Course of Typhoid Fever carries with it some worries not connected with either gastric ulcer or pulmonary tuberculosis, in that a toxæmia of severe grade is added to the loss of blood.

It is not with the intention of adding anything new that I venture to speak of it.

It is in a sense a reproach to medical men that typhoid hæmorrhage has to be treated in much the same way as our fathers treated it, and the results are not much better. There are those who say that hæmorrhage in the course of typhoid is not to be feared, but rather is a good thing for the patient. That after a brisk hæmorrhage a very ill typhoid may take a turn for the better is certainly true, but it is also too true that during or after a hæmorrhage he may die.

I cannot imagine anyone going through the yearly epidemics of typhoid which we used to know in Montreal and retaining anything but righteous fear of typhoid hæmorrhage.

As one remarked during the war, "The man who says you get accustomed to shells bursting near you is either a stranger to the truth, or he lacks imagination."

The early bleedings in typhoid are due to the congested Peyer's patch, but the later ones to the opening of a vessel or vessels in a necrotic area.

The same pathology which underlies hæmorrhage may result also in perforation, and in a fair percentage of hæmorrhage cases perforation does occur,—adding another to the reasons for anxiety in dealing with a typhoid hæmorrhage. What then shall be our procedure—when we either know or suspect that a typhoid patient has developed hæmorrhage?

First, if he hasn't a nurse, he should get one somehow, for he will never need her as badly again. If he is in a hospital, he may be thankful.

There should be no examinations other than those necessary to verify the fact of bleeding, and to know the state of his circulation.

Let there be no whispered conversations within earshot. If

anyone wants to whisper, let him go down cellar or out in the street. No patient can hear whispers and not be worried.

Everything given by mouth should automatically cease. The patient should receive a hypodermic of one-sixth or one-quarter grain of morphia.

I say this advisedly; Barker advises that it be not given, since perforation occurs so often in cases with hæmorrhage, but the first aim of treatment is to resist death, and it would profit little to be in a position to recognize a perforation in a patient who subsequently died of hæmorrhage; and it is a question of mental attitude rather than morphia through which perforaton is overlooked. If one regards every typhoid as a potential perforation, this oversight will not likely occur

Rest should be absolute,—of mind and body, even to the point of using a pad for a bed pan, but one may make this exception, that a pillow may be tucked alternately under each side to take the weight off the sacrum, for a bed sore can come almost while you are looking at him, and on two occasions I have seen death occur from septicæmia following infection of the back, after recovery from the hæmorrhage.

The posture is of importance. It is a routine to raise the foot of the bed, which seems to me a serious error. Nature stops bleeding by establishing syncope, and the nearer the fainting line we can keep the patient the better off he is, and fainting is prevented by lowering the head.

Similarly by bandaging the thighs to the point of cyanosis we remove considerable blood from circulation and lower further the pressure. This can be gradually restored later. In this connection the question of the use of saline solution either under the skin or into a vein, or even of transfusion must be carefully weighed, and I know of no medical problem requiring more balanced judgement.

Nourishment should be withheld for as long a period as possible, but after twenty-four hours water may be given in teaspoonful doses every hour or two for the sake of the mouth, for a dry mouth means probable pneumonia or parotitis.

Chewing gum is an excellent prophylactic, if the patient's scruples can be overcome.

In forty-eight or probably seventy-two hours small sips of milk may be given.

Ice has always appeared to me a useless article.

It increases a thirst and its coldness may readily stimulate reflexly the bowel musculature which we wish to quiet.

The bowels may be moved in five days by an olive oil enema.

An agglutination test of the patient's blood and of possible donors' should be made on the first appearance of hæmorrhage, if not before, for if transfusion is needed it will be needed in a hurry.

We have confined our remarks up to the present to the circulatory features of the hæmorrhage, but the chemical ones—those bearing upon coagulation have to be considered. These will be taken up together in their bearing upon hæmorrhage as a whole.

Another condition which from the standpoint of treatment comes in the class with typhoid except for its special toxæmia is uræmic ulceration of the bowel. The condition is not common, but two cases have come under my notice, one a young woman with a very markedly contracted kidney who had profuse melæna, from which she died and at autopsy showed a very widespread ulcerative condition of the small and large bowel.

Another elderly man under treatment for cardio-renal disease with hypertension, became almost ensanguinated from hæmorrhage from the bowel.

He recovered, but died later at home from uræmic coma.

The hypertension cases are wont to alarm us frequently with their severe epistaxis, and though the local treatment of the nose bleeding is essential, the use of morphine and of nitrites and of a rigid rest and dietetic régime is also essential.

The treatment of the *Essential hæmorrhagic diseases* is a matter for serious consideration, but in the absence of definite knowledge of their ætiology, our treatment is largely empirical even yet. However, some very definite progress has been made, and certain groups may be broadly distinguished.

Howell's theory of blood coagulation presumes certain elements in the process.

In the circulating blood—prothrombin and antithrombin, the latter acting to prevent clotting within the vessels, and also fibrinogen and calcium. When blood is shed, antithrombin is neutralized by thrombo-plastin, found in tissue juice, red cells and platelets. The liberated prothrombin, activated by calcium, converts soluble fibrinogen into insoluble fibrin, the basis of the clot. The means of differentiation between the hæmorrhagic diseases which are available clinically are:

1. "The coagulation time," or the time taken by the blood carefully drawn by a needle from a vein to form an invertible clot in a medium sized test tube—normally twenty minutes.

2. The "bleeding time"—the time during which blood flows

from a small wound in the skin—the measure of the tissue response—normally three minutes.

3. "Time of retraction" of the clot, normally complete in twenty-four hours.

4. The estimation of the number of blood platelets.

5. The estimation of the prothrombin content by adding to oxalated blood varying amounts of calcium. With the optimum amount normal blood should clot in ten minutes, while hæmophilic blood may take an hour.

6. The exposure of the clot at body temperature when abnormal fibrinolysis is shown by dissolution of the clot inside of twelve hours.

7. The comparison of the coagulation time of a blood sample with a control, and then the addition of calcium chloride to each, and noting any change in the time.

These methods indicate whether one or other factor in coagulation is abnormal.

Thus it is found that in hæmophilia and in hæmorrhage of the newborn, prothrombin is deficient. In purpura hæmorrhagica the platelets are diminished. In hepatic cirrhosis there is found abnormal fragility of the clot. In obstructive jaundice the calcium while not deficient is bound by bile pigment.

In septicæmia there may be antithrombin excess.

Thus the rationality of blood transfusion in the first three, as it supplies both prothrombin and platelets, and the experimental futility of serums, which supply neither.

Obstructive jaundice offers perhaps the one field in which calcium salts may be of service.

Hess makes the broad distinction between hæmophilia and purpura as follows:

The hæmophilic is a male, with an hereditary history of bleeding, whose blood shows a definite delay in coagulation time, whose platelets are normal in number, in whom the bleeding time is not increased, who shows no hæmorrhagic reaction on needle punctures of the skin, nor ecchymosis after compression of the arm by bandaging.

A typical purpura may be either male or female, the plasma coagulates in normal time. The number of platelets is decreased, frequently below 1,000,000. There is subcutaneous hæmorrhage following puncture of the skin, an increase in bleeding time, and petechial hæmorrhages following compression by a tourniquet.

Mention has been made of certain substances which have been employed to assist coagulation and thereby arrest hæmorrhage.

Hanslik and Weidenthal have made a detailed investigation of a number of these and I may summarize their findings.

Their method is to make a 0·1 per cent. oxalate plasma from freshly drawn dogs' or cats' blood.

Another portion of blood is allowed to clot and the serum retained.

A control mixture is made of oxalate plasma, serum, and normal saline solution.

The substance to be tested is added to another tube of the same mixture and the effect upon the clotting time is noted.

The substances tested were:

(a) Thromboplastin—a saline extract of brain containing much protein, some kephalin, ferments, salts, etc.

(b) Kephalin, a lipin prepared by extraction of brain with ether, and regarded by Howell as the body which neutralizes antithrombin.

(c) Coagulin—a lipoid, said to be prepared from blood platelets.

(d) Coagulose, said to be an acteone—ether precipitation product of horse serum.

(e) Hæmostatic serum, said to be a balanced solution of prothrombin and antithrombin.

Their conclusions were as follows:

The thromboplastins shorten the clotting time to one-twentieth or one-tenth, as compared with normal salines.

The kephalins possess one-seventh to one-third the activity of the thromboplastins and shorten the clotting time to one-third or one-half.

Freshly obtained coagulin, hæmostatic serum and coagulose do not hasten coagulation time, and are therefore inert as thromboplastic agents.

Thromboplastin and coagulin produced in guinea pigs marked anaphylactoid phenomena, but kephalin appeared to be relatively harmless in that regard.

Both kephalin and thromboplastin lose their activity on keeping.

An old (thirty-two months) thromboplastin and a very old (five years) kephalin were found quite inactive.

The application of thromboplastin and kephalin to a bleeding area on a dog's pad agreed in general with its effects in vitro.

In the course of their work they found that bleeding alone promptly shortened the coagulation time, quite apart from the use of any of the above agents.

Calcium salts have not, with the one exception of in obstructive jaundice, justified the claims at first made for them as hæmostatic agents.

Hypertonic saline five per cent. and ten per cent. solution injected into a vein in five and ten c.c. doses has a rational foundation by breaking up formed elements of the blood and setting free thromboplastin.

For some years we used this method freely in typhoid hæmorrhage with apparently good effect in some, but not all cases; a danger to be avoided being the escape of the solution into the skin or subcutaneous tissues where it causes necrosis.

Transfusion of whole blood. This is the sheet anchor in the treatment of medical hæmorrhage and the scope of its usefulness widens daily.

In typhoid hæmorrhage and in gastric bleeding it may be required to replace the actual blood lost, while in the essential hæmorrhagic diseases it furnishes the missing elements to accomplish clotting.

The technique of testing donors and recipents and the methods of administration are apart from our purpose, but I would strongly suggest that in each community some one medical man should master the art, because only familiarity with the details will make one useful in an emergency.

The relative indications for transfusion are only to be gauged by a careful survey of all the factors, but a constantly dropping hæmoglobin and a blood pressure approaching 70 systolic are absolute indications.

The administration of blood through the superior longitudinal sinus offers a ready method of the greatest value in the melæna and other hæmorrhagic diseases of the newborn.

A COURSE OF TREATMENT FOR EARLY SYPHILIS

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EVERY syphilologist, almost without exception, has his own routine course of antisyphilitic treatment, formulated from experience, which he follows, more or less, in detail. The general practitioner, on the other hand, when confronted by a case of active syphilis, unless special advice is available, feels very uncertain as to the number of injections and the dosage of arsphenamine he should give his patient, the intervals between the injections and the amount and method of administering mercury. On consulting current literature for help he finds himself even more bewildered by the many conflicting opinions. Frequently, this bewilderment results in the patient being placed on mercury, usually by mouth, and the case is lost to view to reappear, perhaps, after the lapse of several years with one of the late manifestations of the disease, when, even under expert care, he has before him, at the best, only a shattered existence for the remainder of his life. The purpose of this paper is to aid the general practitioner in the management of his most difficult problems.

In submitting this course it must be understood that we believe syphilis is too serious a disease and its treatment of too delicate a nature to be attempted by anyone whose experience with the disease itself and with the administration of the necessary medicaments has not been of a wide nature, but as the specialist does not and probably never will see the majority of cases of syphilis, especially during the acute stage, some aid must be lent to the general practitioner in order that many cases of syphilis which would otherwise be untreated, may be properly cared for.

It would seem unnecessary in the present day to insist on the fact that mercury, alone, is inadequate treatment for syphilis.

Read before the Harvey Club, London, Ont.

Many cases of late syphilis are seen still, however, whose only treatment has been mercury, usually by mouth. Mercury is a valuable drug and on it a great deal of reliance is still placed, but its action is too slow to control the disease in the acute stage and there is a vast weight of evidence to prove that the practitioner who treats his cases with it alone, places himself in the position of a man who attempts to kill a lion with birdshot.

On the other hand the exclusive use of the organic arsenical preparations, though it will control the early stages of syphilis, tends to become of less value with time. The spironema pallida very rapidly becomes arsphenamine-fast if exposed to closely repeated doses and so is enabled to grow unchecked in its immunity to the drug. Combined arsphenamine and mercury are necessary for the proper treatment of syphilis, with the addition of potassium iodid for the purpose of breaking down the scar tissue in the lesions already formed and so enabling the mercurial-arsphenamine medication to act on the scar-protected organisms. Potassium iodid also has a weakly spironemocidal action.

There is little question, then, of the proper medicaments to be administered but the troublesome points are the amount of each drug to be given, the method of administration and the time interval between the treatments.

Generalizing from the literature there appear to be two systems of treatment. One is to give intravenous arsphenamine and intramuscular mercury at intervals, varying from four days to a week, till the blood Wassermann, if positive before treatment, becomes negative, or if negative before treatment is commenced, for an indefinite period of time. When this course is completed treatment is allowed to halt until the blood again becomes positive or signs of clinical recurrence appear.

The second system is to give seven injections of arsphenamine and eight injections of mercury at intervals of one week, and, if the blood is negative then, to stop treatment and wait till a further positivity, either serologically or clinically, occurs. If the blood still should be positive at the end of the first course four more injections of arsphenamine and mercury are given and, if positive then, twelve injections of mercury and potassium iodid for three months are given.

There are a number of objections to both of these courses. The first method is apparently the customary one in several of the large dispensary clinics. It is not our purpose to question its use there, as these clinics are usually in charge of a competent syphilolo-

gists, who cannot derive much benefit from an article like this. Furthermore, dispensary patients are notoriously difficult to keep under observation for a long space of time and with them the aim of treatment must be to combat the disease as rapidly and as effectively as can be done in a short period. But for the general practitioner, who can usually observe his patients for several years, the objections to this course are as follows:

First. The mechanism producing the Wassermann reaction in the blood is not yet understood sufficiently to determine whether a negative result in the first year or so of the disease is an indication for stopping treatment.

Second. The amount of arsphenamine given will probably be so large for such a short period of time that, not only will the spironema pallida tend to become arsphenamine-fast, but there is grave danger of poisoning the patient, with serious and possibly fatal results. The current literature of late has contained reports of several series of such cases.

Third. If the blood is negative before treatment is commenced there is hardly any indication given as to when treatment should be interrupted and the patient may be taken off treatment with no signs of the disease, either serologically or clinically, until neurosyphilis becomes apparent years later.

The objections to the second course are as grave. In the first place it is entirely inadequate. The large dosage of arsphenamine given in the first two months may only tend to drive the spironema pallida into a resting form, in which it will remain unaffected by the drug but on the cessation of the arsenic will be enabled to return to the spirochetal stage and proliferate unchecked. If the patient is still kept on mercury the organism may become mercury-fast, and a similar result occur. If, under this method of treatment the spironema pallida can produce visible lesions the organisms must have been growing and spreading unmolested for some time. In the second place the occurrence of icterus and other forms of arsenical intoxication show that the host ordinarily finds difficulty in adapting himself to massive doses of arsphenamine given over such a short time interval.

These two methods of treatment, then, are either insufficient to check the disease or else toxic to the host. Neither course indicates definitely the length of time treatment should be continued. To the syphilologist this depends on the individual case but the man with small experience finds no guidance except the vague statement that treatment should be continued for several years.

The object of all courses of treatment for syphilis is to sterilize the host from the invading spironema pallida with the maximum efficiency in the minimum time period, that is compatible with safety to the patient. Even with the most ideal course it is impossible to shorten the length of time over which treatment should be given, i.e., at least two years, and this our suggested course does not attempt to do. We offer the course not as something new, but that the general practitioner may have some guide by which to avoid the Scylla of inadequate treatment on the one hand and the Charybdis of medicinal intoxication on the other. As his experience grows with its use he may alter it to suit himself but till then it would be more advisable to follow it strictly.

When a patient is seen with primary syphilis and his blood Wassermann is negative he should be placed immediately on the following course which covers a period of two years.

1st day—Arsphenamine, gm. 0·3, or neo-arsphenamine, gm. 0·45—hg. grs. 1.
8th day—Arsphenamine, gm. 0·4, or neo--rsphenamine, gm. 0·6—hg. grs. 1.
15th day—Arsphenamine, gm. 0·6, or neoarsphenamine, gm. 0·75—hg. grs. 1.
22nd day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.
29th day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.
36th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.
42nd day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.
49th day—Arsphenamine, gm. 0·3, or neo-arsphenamine, gm. 0·45—hg. grs. 1.
56th day—Arsphenamine, gm. 0·6, or neo-arsphenamine, gm. 0·75—hg. grs. 1.

Fourteen days interval from antisyphilitic treatment, during which patient is given a good tonic. Wassermann reaction.

70th day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.
77th day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.
84th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.
91st day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.
98th day—Arsphenamine, gm. 0·3, or neo-arsphenamine, gm. 0·45—hg. grs. 1.
106th day—Arsphenamine, gm. 0·6, or neo-arsphenamine, gm, 0·75—hg. grs. 1.

Twenty-eight day interval with tonics. Wassermann reaction.

134th day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.
141st day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.
148th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.
155th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.
162nd day—Arsphenamine, gm. 0·3, or neo-arsphenamine, gm. 0·45—hg. grs. 1.
169th day—Arsphenamine, gm. 0·6, or neo-arsphenamine, gm. 0·75—hg. grs. 1.

Eighty-four day interval with tonic. Wassermann reaction.

253rd day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.
260th day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.
267th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.
274th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.

Eighty-four day interval with tonics. Wassermann reaction.

358th day—Arsphenamine, gm. 0·3., or neo-arsphenamine, gm. 0·45—hg. grs. 1.
365th day—Arsphenamine, gm. 0·6., or neo-arsphenamine, gm. 0·75—hg. grs. 1.
372nd day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.
379th day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.
386th day—Potassium iodid, grs. 30, t.i.d , p.c., by mouth and—hg. grs. 1.
393rd day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.

Eighty-four day interval with tonics. Wassermann reaction.

477th day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.
484th day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.
491st day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.
498th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.

Eighty-four day interval with tonics. Wassermann reaction.

582nd day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.
589th day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.
596th day—Potassium iodid, grs. 50, t.i.d., p.c., by mouth and—hg. grs. 1.
603rd day—Potassium iodid, grs. 50, t.i.d., p.c., by mouth and—hg. grs. 1.

Eighty-four day interval with tonics. Wassermann reaction.

687th day—Arsphenamine, gm. 0·3, or neo-arsphenamine, gm. 0·45—hg. grs. 1.
694th day—Arsphenamine, gm. 0·6, or neo-arsphenamine, gm. 0·75—hg. grs. 1.
730th day—Wassermann reaction.

If no clinical signs of the disease have been observed since the healing of the primary lesion and the blood has been persistently negative the patient should remain off treatment for six months. At the end of this time, if still clinically and serologically negative, a provocative injection of arsphenamine should be given and a Wassermann test done a week later. If this is negative the disease may be considered to be arrested and the patient clinically cured. Should any recurrence appear through the course or during the final rest interval the patient should be referred to a competent syphilologist.

When a patient is seen with clinical signs of primary syphilis and a positive blood Wassermann or if he already has signs of generalization he should be placed on the same course with these variations.

During the first rest interval a lumbar puncture should be done and the cerebro-spinal fluid examined to determine if invasion of the nervous system is commencing. Special advice should be sought should the result be positive.

On the seven hundred and thirtieth day of treatment, instead

of a blood Wassermann being taken, the patient should repeat the second half of the course, commencing with treatment as on the three hundred and seventy-second day, and continuing to the end, thus making the complete course cover three years instead of two.

When the three year period of treatment is completed the patient should wait six months, have a blood test and if this is negative, wait another six months, repeat the Wassermann and then be given a provocative injection of arsphenamine and a blood test in a week. If this is negative also and there are no clinical signs of the disease arrest of the syphilis may be concluded.

We advise neither of these courses if the case is late generalized, tertiary, visceral or neurosyphilis, for we believe that these types of cases should be referred at once to a specialist.

The dosage listed in the course is that for the average sized individual in good general health, i.e., about ·003 gms. per lb. body weight. For those whose weight is less than the average or whose general health is poor the dose should be smaller in the same ratio; for large-bodied patients larger. In administering neo-arsphenamine we have found that a dilution of 0·15 gms. per c.c. of sterile distilled water given by a small syringe, to be the easiest method and the one least liable to be followed by immediate reactions or later toxic manifestations. Arsphenamine should be given in greater dilution. Mercury should be administered as one of the insoluble preparations, intramuscularly. It causes less pain and discomfort if a point three fingers' breadth posterior to the anterior superior spine of the ilium and three fingers' breadth inferior to the iliac crest be taken as the place to insert the needle.

At the commencement of the course the mouth of the patient should be carefully examined by a dentist, and, if necessary, dental treatment instituted. A mouth wash of ipecac and arsenic, for use three times a day, should also be given. This has been found very beneficial in preventing mercurial stomatitis. Throughout the course the patient's mouth should be frequently examined and if signs of mercurial intolerance develop, the patient should be given a rest period off mercury for one month. Similarly, the urine should be examined at short intervals during the course for albumen, bile acids, bile pigments, and urobilin. (In examining for the first mentioned substance, care should be taken that a positive ring test before or after the first one or two injections of arsphenamine, is not taken as an indication of albumen as it may be due to the seepage of lipoid globulin from the blood.) The appearance of

such substances in the urine, without other cause being present, is an indication for the cessation of arsephenamine for at least six months. With the course here advised these complications seldom occur.

The rationale of this course should appeal to the syphilologist as well as to the general practitioner. The first three injections of arsphenamine and mercury are usually sufficient to heal any open lesions the patient may have and to sterilize the blood of the actively spreading organisms. After these the patient is usually non-infectious, except through sexual intercourse. The arsphenamine is discontinued then for one month, to allow the arsenic stored in the tissues to be excreted before it has produced any appreciable injury to the large viscera. During this time the spironemoncidal action of the mercury is continued, combined with that of the potassium iodid. Should any spironema pallida be still freely circulating or should they become uncontrollable by the mercury the fourth and fifth injections of arsphenamine are sufficient to destroy them. At the end of this period the blood, if positive before treatment was commenced, in an early case will be found negative, while if negative before treatment will still be negative.

During the first fifty-six days a sledge-hammer blow has been struck at the disease, but our antisyphilitic agents are also relatively toxic to the host. Arsphenamine may produce the most serious effects, but mercury often produces much discomfort which though without grave results is annoying to the patient. The rest periods are instituted in order to avoid these disturbances as much as possible. During the first interval of fourteen days the patient should be given tonics and his general health improved so that he may be in a better position, not only to tolerate further treatment but also more able to produce antibodies against his disease.

Four more weeks are allowed to elapse before further arsphenamine is administered. During this time the disease is under the influence of the slowly absorbed and slowly execreted mercury but in order that any organisms which may have been able to proliferate or any organisms which are becoming resistant to mercury may be destroyed before causing further serious damage two more injections of arsphenamine are given.

The rest intervals are lengthened gradually to enable the body to recover from the accumulative effects of the medication. The periods between the injections of arsphenamine are lengthened also so that the tendency of the spironema pallida to become arsphenamine-fast is decreased to a minimum. During the long

rest intervals and during the time that the patient is receiving mercury and potassium iodid alone, should the organisms be infesting the tissues in some resistant, resting stage they have the opportunity of returning again almost unhindered to that from which is most susceptible to the action of the arsphenamine, i.e., spirochetal stage. The occasional injection of arsphenamine does not have to exert its action with the minimum effect on a relatively immune form, but can deal a vital blow at the organism in a relatively unprotected condition. These hammer blows at long intervals seem to us the most effective method of using the arsenical preparations while all the time, even during the rest intervals, the mercury is slowly but powerfully acting on the disease.

We believe that with such a course the dangers of mercurial intoxication and the more ghastly and certainly more harmful arsenical poisoning are eliminated with a more effective influence on the disease itself.

Conclusions

1. This course of treatment is offered to aid the general practitioner to avoid the dangers of inadequate treatment of syphilis on the one hand and of producing medicinal intoxication of the patient on the other.

2. Continued treatment with mercury and potassium iodid, alternating with rest intervals, with occasional injections of arsphenamine is the most effective method of controlling the disease.

3. General tonics should be administered during the rest intervals to combat the toxic effects of the antisyphilitic treatment and to raise the antibody production of the patient. This is as important as the actual treatment itself.

4. Treatment for early primary syphilis should be continued for two years. Treatment for late primary and generalized syphilis should be continued for, at least, three years.

SYPHILIS OF THE CENTRAL NERVOUS SYSTEM; ITS EARLY RECOGNITION AND TREATMENT

By A. Rocke Robertson

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THE early detection of involvement of the central nervous system must be constantly before us in our treatment of syphilis, if we are to prevent those grave end-results, tabes dorsalis, general paralysis, etc. To-day the alert physician justly considers that he has failed in his duty to the tubercular patient if he has overlooked the early phase of involvement, the incipient phase. Just so must it be in the case of syphilis of the central nervous system; it must be detected in its incipient stage. In a broad way, too, there is a striking parallel between these two infections. Pathologically, each produces a lesion that closely resembles the other in histologic character and in tendency to chronicity with gradual extension. Clinically, syphilis of the central nervous system, has, like tuberculosis, its incipient stage that may often be recognized by symptoms, signs and laboratory methods no less trustworthy than those that we employ in our search for tuberculosis.

It is essential first of all to obtain as clear a picture as possible of the resultant reactions of the tissues involved. We know that the treponema pallida, once it enters the tissues, tends to migrate with great rapidity from the primary sore; indeed, some observers believe that it has already reached adjacent lymphatics and possibly the systemic circulation, before the actual appearance of the chancre. Clinically, the almost simultaneous swelling of the lymphatic glands adjacent to the primary sore seems to bear this out. At all events, the infection very early becomes generalized, a condition of syphilitic septicæmia existing. Proof of this is shown in that the treponema has been successfully isolated and cultivated from the blood of man and experimentally induced syphilis in rabbits and monkeys. The next stage in the activity of the treponema is the early invasion of the walls of the vessels, especially the small ones, there giving rise to lesions in the intima. Capillary

walls are pierced and the lesions here are perivascular. In each case the lesion produced is essentially a connective tissue proliferation; indeed, the treponema seems to migrate with purposeful intent towards connective tissue, there to find favourable lodgement. Those that fail to migrate soon perish.

The histologic picture of the lesion produced is as constant and as characteristic as that of tuberculosis; indeed the lesions are in some situations so similar that histologic diagnosis is difficult and one must rely upon demonstration of the organism, or on certain fairly constant histologic differences. The treponema, like the tubercle bacillus, produces a relatively mild toxin which is capable of causing marked proliferation of connective tissue; endothelial cells also proliferate to some extent. The result is a granuloma similar in size and structure to the miliary tubercle. The treponema pallida is usually found within this lesion, often indeed within giant cells. Many of these granulomata lying close together constitute a small gumma, which, if it be present in the intima of a small vessel, may partly or completely obliterate the lumen. Syphilis is in its broadest sense a vascular disease.

Consideration of the foregoing gives one the key to a fairly clear understanding of the method of involvement of the nervous system, namely, vascular disease. After the treponema has escaped from the vessel wall into the surrounding connective tissue of the meninges, it causes hyperplasia and sclerosis through the medium of its toxin. Neuroglia, a tissue so similar in morphology and function to connective tissue, will also similarly react to this toxin.

Broadly speaking, it is possible, with these facts in mind, to understand that the central nervous sytem with its rich supply of small vessels, may be involved widely or locally; furthermore, the symptoms produced will necessarily depend upon interference with the normal function of centre, tract or nerve. Thus for example, partial or complete obliteration of a vessel may impair or abolish the function of one of these, resulting in some form of paresis, paralysis, anæsthesia, paræsthesia or aphasia; of these the monoplegias are probably the most common. Again, the thickened, sclerosed meninges may constrict or pinch the trunk of an outgoing nerve, especially those of the cranium and it is precisely this lesion which most frequently gives tell-tale evidence of the nature and location of the malady. But there is a still earlier phase of involvement, the incipient stage, characterized by no such tell-tale evidence, but rather by a complex of symptoms that must direct the physician to most careful investigation.

That the central nervous system is very frequently involved in secondary and tertiary syphilis has been abundantly demonstrated. In the secondary stage a common, almost a constant symptom, is a vague sense of nervousness, headache, vertigo, etc. Examination of the cerebro-spinal fluid at this time often reveals changes. Ravaut claims to have found changes in 70 per cent. of cases examined, Plant in 66 per cent. and Nonne and Montoux in 40 per cent. Gennerich believes that all early constitutional cases will, after treatment with arsenic or mercury, exhibit an increase of lymphocytes and globulin in the cerebro-spinal fluid. Treponema have also been demonstrated in the cerebro-spinal fluid. It is highly probable, even, that they escape into the fluid constantly and in large numbers in secondary syphilis only to implant themselves elsewhere on some part of the meninges. It is likely, too, that the posterior root ganglia become involved in this process, which we may style meningeal implantation infection, resulting as it may in symptoms that are the expression of irritation, or degeneration of the ganglion cells, that is to say, anæsthesia, paræsthesia, lightning pains and eventually tabes dorsalis. At least our hypothesis gives a reasonable explanation of the method and location of onset of this malady. Clinical manifestations of early involvement may conveniently be classified into two groups:

1. Non-focal, in which no clue to the actual seat of involvement can be found.

2. Focal, in which a definite point of involvement is indicated by some degree of nerve irritation or injury. This we may call focal neuro-syphilis.

It is certain that focal symptoms often supervene without any previous non-focal or incipient symptoms. Such for instance, are the common ophthalmoplegias, vestibular and auditory nerve disturbances, etc. But, I believe that non-focal symptoms are often overlooked—the physician's suspicion of the true condition only being aroused by some focalizing sign.

Symptoms of the non-focal type are usually very indefinite and are often cast within that vague group we call neuræsthenia, psychæsthenia, etc. Eventually, we may have a fairly clear symptom-complex with which to characterize incipient or non-focal neuro-syphilis centralis. Symptoms, though, that I have found most commonly in this early type are frontal or occipital headache, often severe and intractible, or a sense of verticle pressure suboccipital stiffness or tenderness. Coarse and fine tremor of the fingers is often seen. Darting pains, muscular cramps, skin

areas of anæsthesia, and paræsthesia are frequently found. Mentally there is inability to concentrate, a tendency to be emotional, irritable, or morbid, with vague sense of fear. Noises startle and crowds confuse. The reflexes are quite unreliable and may vary from day to day.

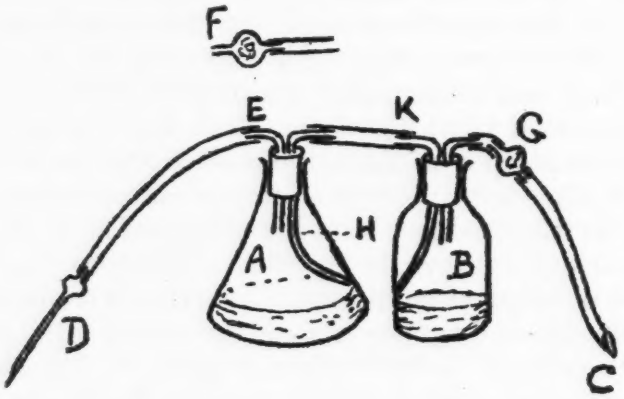
At any time this non-focal type may pass over to the focal in which clear evidence of organic change is revealed. Organic change is probably precipitated in one of three ways. First, by anæmia of areas supplied by arteries that have become almost or entirely obliterated by syphilitic endarteritis. Of such are the palsies, pareses, aphasias, or other disturbances of special senses. Secondly, by pressure of a mass such as a gumma, accompanied by that unique form of pressure, the choked disc, in which an increase of intracranial pressure causes the dura to partly invaginate into the foramen transmitting the optic nerve, thereby pressing upon the latter. Thirdly, by sclerotic pinching, or invasion of the substance, of the peripheral nerves as they perforate syphilitic meninges. For instance, the retinal veins may be found congested and the visual and colour fields contracted, attributable we may suppose to a mild pinching of the nerve by syphilitic meninges. Primary white atrophy of the nerve is often the result of syphilitic invasion of the nerve. These forms of involvement often are the earliest focalizing signs. Our hypotheses of meningeal pinching is strengthened, we believe, by the effect of treatment in which signs due to mild pinching often disappear, leaving no permanent injury.

The difficulty in diagnosis of non-focal cases is often accentuated by the very delicacy of the subject in question. A clear history of syphilis is often lacking and a negative history is practically worthless, as evidence against infection, inasmuch as the patient may deny or be unaware of the onset. Investigation requires examination of the blood and the cerebro-spinal fluid, which cannot well be carried out without arousing some degree of alarm, or suspicion on the part of the patient. The first Wassermann test of the blood may be negative, yet this does not exclude infection because a provocative dose of arsenic or mercury will sometimes produce a positive reaction where the first reaction was negative.

The cerebro-spinal fluid may also yield a very weak positive reaction or a negative reaction which may often be converted into a positive by a dose of arseno-benzol. Thus a definite diagnosis of non-focal cerebro-spinal syphilis is often fraught with many difficulties and the investigation often demands a rare degree of courage and confidence in one's methods of investigation and findings.

Those who have had experience in this work realize the delicacy of the investigation of such cases. Failure tc come tc positive diagnosis in a positive case may condemn the patient tc future trouble of serious consequence.

Apart from the clinical examination, the laboratory procedure that I have found useful is the following. At the time that blood is taken for a Wassermann test, a small dose of arseno-benzol is given intravenously, so that should the first blood withdrawn prove negative another blood test on the fourth day following the arseno-benzol may be made. Should this prove positive, one is justified in strongly recommending lumbar puncture and examination of the cerebro-spinal fluid. This, if positive, may react more strongly than it otherwise would had the small dose of arseno-benzol not been given. At the same time the cell count, and butyric acid test for excess of globulin, etc., should be carried out.



Treatment calls for a rare degree of care and perseverance over a prolonged period, certainly of many months. Many methods are in vogue; some believe that prolonged treatments of intravenous arseno-benzol combined with intramuscular injections of mercury and iodine or similar medications by mouth, will accomplish all that is possible. Others are in favour of combining this with withdrawal of large quantities of cerebro-spinal fluid at intervals. A third method largely favoured to-day, is the combination of these two methods plus the introduction of some form of medication intrathecally. This latter method usually produces excellent results, and may usually be accomplished without much reaction if amount and interval of dosage is carefully watched.

It is not my intention in this paper to cite cases, but briefly present a technique which I devised several years ago and which

I have used with many good results since. The purpose of this technique is to make for simplicity and aseptic handling of the materials used in intrathecal treatment. This technique was especially devised for obtaining and using auto-salvarsanized serum. The apparatus used is briefly the following:

Two flasks, A and B, of 150 to 200 c.c. capacity each, are fitted with pure black rubber stoppers, each of which is perforated with two holes for the passage of glass tubing shaped as indicated in the diagram. Connections of pure black rubber tubing are also indicated so that the operator may by gentle suction at C, draw from the patient's vein through a needle at D, about 50 c.c. of blood into the flask A. The needle and rubber tube are removed at E and a cotton trap F is attached to the open glass tube at E. The cotton traps F and G are simply pieces of glass tubing with a central bulb packed loosely with sterile cotton to keep the contents of the flasks sterile. The flask B contains a measured amount of normal salt solution and is graduated. The entire apparatus is now put aside in a cool place to allow the blood to clot. In twelve to twenty-four hours serum may be transferred from A to B simply by tilting A and drawing serum through the glass tube H. Thus any desired dilution of serum may be made in B, with nothing but sterile air coming in contact with it. Now, by detaching the rubber tube at K and attaching another rubber tube, the opposite end of which has a metallic connection for the lumbar puncture needle, the operator is able to introduce by gravity or by gently blowing at C any quantity of dilute auto-salvarsanized serum desired.

THE MORE RECENT DEVELOPMENTS IN THE USE OF *X*-RAYS IN COMMERCE

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IT was immediately recognized, following their discovery in 1895, that *x*-rays would be of great value as an aid to diagnosis in surgical conditions such as fractures, the localization of foreign bodies in the tissues, etc. Slowly, but surely, the list has been added to, not only in surgical, but in medical conditions also, till, at present, scarcely a department in a modern hospital but depends on *x*-rays for assistance in diagnosis.

The great value of the *x*-ray as a therapeutic agent has also been demonstrated and the future holds promise of much greater developments.

However, it is not the object of this paper to describe the uses to which *x*-rays are put in the medical sciences, but to indicate some of the still newer developments of their employment in commerce.

Before the Great War investigations had already been made on the transmission of *x*-rays through metals. Roentgen himself had, in fact, tackled radio-metallography in the early days of the *x*-rays. In October, 1913, a paper was published on this subject by Mr. H. B. Keen, of the University of Birmingham, England. Similar investigations were also conducted in America, France, Japan and Germany. The advent of the War stimulated interest in this subject to a great extent. In the early period before America entered into the great struggle, *x*-rays were used in the examination of bales of cotton for concealed arms, etc. In 1915, a Japanese contribution appeared in the form of a paper by Mr. C. H. Tonamy, of Kobe, on "The Detection of Blow-holes in Castings by means of *x*-ray Examination." It is, of course, essential that every part of a machine should be fully up to its calculated strength. The detection of blow-holes, or flaws, in cast or forged materials is, therefore, of the greatest importance.

This, Mr. Tonamy demonstrated, could be done provided the specimens examined were not of too great thickness.

Mr. Davey, of the General Electric Company, Schenectady,

Fig. 1.—Radiograph of aeroplane hollow "box" strut, showing badly fitting internal end-block split by screws (Kaye & Knox).

Fig. 2.—X-ray photograph showing front and side views of a laminated wooden spar of an aeroplane. The spar is made up of three laminæ glued together. The external appearance did not indicate that the middle layer contained two knots and a grub-hole and should not have been used.

Fig. 3.—X-ray photograph of an aeroplane wing-skid which did not bed properly into its aluminium socket. The wood skid was cut off too short, and a packing piece (B) was introduced into the space below. (Kaye & Knox).

also devoted much time to this problem. His conclusions were, that all work in metals must be done radiographically as no known fluorescent screen was of sufficient sensitiveness for this work. Valuable information could be obtained as to the presence of blow-holes, slag inclusions, porous spots and defects of a similar nature which could not otherwise be demonstrated except by cutting into the article.

In 1916 Monsieur Henri Pilon, in the works of Messrs. Schneider of Le Creusot, examined welded iron and steel specimens and detected bad portions. As an example, he demonstrated the faulty weld of an iron tank, with metal 10 mm. in thickness, the rays passing through the two sides of the vessel, making 20 mm. thickness of iron. Again, blow-holes which had been filled with an alloy of greater density, in the metal of an aluminium gear case of an aeroplane engine, were also shown.

Further investigations were made, by E. Schneider, of blow-holes in cast steel. Radiographs of fish-plates were made showing numerous blow-holes. Other plates were also examined which had been made at the same time as those first examined, with steel from the same cast, in moulds made from the same sand and dried under the same conditions. At the moment of casting these latter plates, however, varying amounts of aluminium per kilogram of steel were added. A diminution in the number and size of the blow-holes was noted as the quantity of aluminium added on casting was increased. It was, therefore, concluded that, by radiographing test pieces containing increasing quantities of aluminium, it should be possible to determine, for a given casting, the minimum quantity of aluminium to be added to eliminate central blow-holes.

Perceptible differences in density were noted in radiograms of several specimens of steel containing different percentages of carbon, while still further changes in density were noted in steel containing varying percentages of tungsten. It would appear possible, therefore, to apply radiography for the purpose of a rapid analysis in particular cases. If, for instance, carbon steel bars were mixed inadvertently with tungsten steel bars, they could be sorted out speedily by radiography, instead of by chemical analysis, which is a long, delicate and expensive operation.

During the war much work was done in the examination of steel castings for guncarriages, etc. Unfortunately the value of the method was somewhat lessened by the lack of penetration of the rays. The present practicable depths which can be penetrated into metals are:—4-5 mm. of lead; 12 mm. of tin; 7-5 cm. of steel (carbon) or iron; 10-15 cm. of aluminium or its alloys;

30-40 cm. of wood (Kaye). Investigations are being made at the present time, however, to overcome this limitation.

Progress in this direction is possible in three directions.

(*a*) The use of much higher *x*-ray outputs.

This is a matter for the electrical engineers to arrange.

(*b*) The use of higher voltages on the *x*-ray bulb.

Most of the electrical energy is wasted in the form of heat—on an average only 1 part in 1000 being efficient. Thus we have to contend with the double problem of increasing the energy input and getting rid of the heat evolved. For example: Coolidge carried out some remarkable experiments, in 1915, on water-cooled tubes, some of which he ran continuously for two or three days, passing 200 milliamperes at 70,000 volts. The rate of energy input was thus 14 kilowatts or eighteen horsepower. Such a power input would raise the temperature of one pint of water at room temperature to the boiling point in twenty seconds. This gives some idea of the rate the water had to be rushed through the target to prevent boiling. Coolidge then anticipated being able to reach an input of fifty kilowatts, i.e., nearly seventy horsepower.

Glass tubes will not stand up to excessive energy input. Silica or metal bulbs have been suggested. In fact, a metal bulb was used by Sir Oliver Lodge many years ago, and more recently Siegbahn has used such a bulb for his *x*-ray spectrometer work. Mr. Campbell Swindon, F.R.S., has suggested the construction of a tube something of the Coolidge type, perhaps one or two feet in diameter, and made of steel, such that fifty kilowatts could be put into it with four or five hundred volts.

(*c*) The use of much more sensitive fluorescent screens, photographic plates, or other detectors.

So far as the photographic side is concerned, it is necessary:

1. To reinforce as much as possible the rays which fall on the plate. This may be done by using reinforcing screens, the degree of intensification thereby being fifteen to one. By using duplitized films with two screens the speed is increased thirty times or more, and differences in thickness of one-tenth of a millimeter through forty-five millimeter of steel can be shown.

2. To protect the plates against all rays not actually used for the taking of radiographs which only tend to fog the plate.

To accomplish this it is necessary to surround the object for examination with lead 5 mm. thick. Pilon and Pearce have accomplished this with objects which are of irregular shape, by surrounding them with very fine lead shot and so covering the plate, except at the spot directly below the object, to a depth of at least

15 mm. Should the object be of such a shape that the shot would find its way underneath, the object was cast inside a block of transparent wax and the edges then trimmed.

The examination of aluminium castings of various parts of aeroplane engines was carried out with considerable success during the war. An examination of a large number of sand-castings and mould-castings were made, with the result that the mould-castings were found far superior and far less liable to defects. The interiors of cartridges, torpedoes, bullets, fuses, grenades, shells, etc., were also examined by this method and flaws detected in a number of cases. It was found possible to radiograph the internal parts of an explosive body 55 cm. in diameter made of steel 12 mm. thick, and to distinguish the smallest details, such as springs, etc., which were situated in the interior. Much work was also done in England, during the war, by Knox and Kaye, on the examination, by x-rays, of aircraft timber. Owing to the nature of the materials examined they were able to use the fluorescent screen in almost all instances. The principal defects which they had to look for were spiral grain. large hidden knots, large resin pockets, compression shaker, incipient decay, grub-holes, and the like; and it was possible, though only with difficulty, if the specimens were not too thick, to detect compression shakes, incipient rot and spiral grain. The annular rings of the tree could be clearly shown. This had a practical bearing in that the presence of localized hard grain—an objectionable feature for aircraft purposes—was readily detected.

It was, however, in connection with finished and assembled parts that the x-rays proved their greatest usefulness. This was particularly so in those parts constructed on the laminated or "box" principle, where, owing to the type of construction defects could be concealed with ease; or, where a strut or spar is completely covered with fabric, veneer, or plywood.

Examples, such as the following, were found. Figure 1 shows the interior view of the end of a hollow box strut. The internal strengthening block is seen to be badly fitted and each of the screws has split the wood. Figure 2. Front and side view of a laminated spar consisting of three layers of wood glued together. The outside surfaces are perfect all round, but the x-rays disclosed a large knot and grub-holes in the middle layer. Figure 3. A radiogram of a wing-skid which did not bed properly into its aluminium socket. The wood had been cut off too short, and a packing piece (b) was introduced into the space below.

The British postal authorities have, for years, been using x-rays for the examination of gutta percha for submarine cables,

as it is possible by this means to detect inferior grades or the presence of adulterations. It has even been suggested that *x*-rays might be used to detect flaws in telegraph poles!

Motor, aeroplane and cycle tyres are also examined with the *x*-rays for faults in material or construction.

Radiographic examinations of carbon electrodes used in steel-making furnaces have been carried out by Sir Robert Hadfield. These electrodes vary in size up to no less than 20 inches in diameter. Considerable trouble is experienced with them, due to various causes, but principally to fracture in use or handling which, if the broken end of the electrode falls into the steel bath, may be disastrous to a whole cast of steel. Sir Robert Hadfield is doubtful if much further light has been thrown on the behaviour of electrodes as the result of these investigations, but suggests that probably the best use of radiographic examination might be made in connection with systematic experiments on electrode manufacture, where variations of composition, baking temperature, etc., could be carried out step by step. It is possible that differences in structure might then be traced in the various radiographs obtained and connected with the variations in manufacture.

Mr. A. C. Freeman, an American, has recently published an interesting paper on the use of *x*-rays applied to the examination of reinforced concrete ship construction. The procedure is first to show by means of a series of radiograms that the standard of uniformity of mix and compactness is maintained; secondly, to observe any misplacement of reinforcing, which, recognized in time, may still be remedied; thirdly, to detect the presence of voids as the structure develops, thus permitting of their timely elimination. His outfit weighs about ninety pounds.

Among other objects now being examined by *x*-rays are; golf and cricket balls; electric cables; electric insulators, for metallic particles; the wooden spokes of wheels; turbine plates; minerals; fossils and shells, built-up mica.

Dr. Heilbron, of Amsterdam, has demonstrated the value of *x*-ray examination applied to old oil paintings in order to discover any alterations which may have been made since the completion of the original work.

Though not directly connected with the subject of this paper it is of interest to notice the recent investigations of Henri Beclere, who has shown the value of the *x*-rays in a new development of finger print markings. These he obtained by treating the skin with red lead, subsequently making a radiogram of the surface markings and openings of the cutaneous glands.

THE SIGNIFICANCE OF THE CALCIUM-ION IN THE CELL—EXPERIMENTAL TETANY

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FOR the manifestation of the normal metabolic processes in any living organ, tissue, or cell, it is first essential that definite equilibrium be maintained between the crystalloid and colloid of the protoplasmic base. The great significance of various inorganic salts in physiological processes is a well-known fact. It has been suggested by Macallum[1] that the presence in the blood of ions of various simple salts in definite concentration is an heirloom from our marine ancestors who inhabited the primeval ocean. The inorganic ions of the electrolytes NaCl, KCl, $CaCl_2$, $NaHCO_3$, NaH_2PO_4, and Na_2HPO_4, are of fundamental and chief importance in the maintenance of orderliness in the cell. The well known researches of Ringer[2] Locke[3] and others have clearly demonstrated that not only are various ions of electrolytes essential to the well-being of the living cell but also that each ion must be present in some definite concentration. In other words there is in protoplasm a balance between colloid and crystalloid, and also a balance on the one hand between various organic constitutents of the colloidal complex, and on the other between the various ions of the inorganic complex. Many examples might be quoted to illustrate this latter principle. For instance a slight increase in the calcium content of Ringer-Locke's fluid with which an isolated heart is being perfused will cause the relaxation to be incomplete and the heart may finally stop in systole. Similarly it can be shown that the increase or decrease of the concentration of various ions produces characteristic manifestations. Since this is true it is probably out of place to speak of the significance of one inorganic constituent of tissue, namely calcium, as the effect of increasing or decreasing the amount of any ion is not so much due to the direct action of the ion under

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consideration as to the disturbance of the normal balance between the particular ion and some or all the others present. With this fact in mind I would like to refer briefly to some of the results which I have obtained during the past year.

In the course of an investigation of the effect of prolonged hyperpnœa upon the alkali reserve of the blood plasma, the carbon dioxide tension of the alveolar air, and the rate of excretion of water, acid and basic phosphate, and ammonia by the kidneys[4] it was found that several subjects after a few minutes of hard puffing developed definite tetany which was most marked in the muscles of the fore-arms, fingers, and face. The determination of the alkali reserve of the blood, and the carbon dioxide tension of the alveolar air before, during, and after the periods of voluntary hyperpnœa disclosed the fact that a definite alkalosis or a decrease in the H-ion concentration of the blood was induced by the excessive breathing and that on the cessation of the hyperpnœa the reaction of the blood returned to normal in from fifteen to thirty minutes. The alkali reserve of the blood fell rapidly with the onset of the forced respiratory movements but it rose with equal rapidity when the hyperpnœa ceased. It was therefore evident that with the washing out of an excessive amount of volatile acid, CO_2, at the lung surface a somewhat equal amount of base was removed from the blood by the tissues by way of compensation. The tissue alkalosis thus produced was undoubtedly the cause of the tetany manifested. A disturbance in the kation equilibrum as a result of the rendering of the calcium-ion less available by the slight change in the alkalinity of the tissue fluids is the hypothesis suggested as to the manner in which the observed stimulation of the muscles was effected.

A series of experiments on animals in which injections of distilled water and various electrolytes were made into the subarachnoid space has confirmed the writer in this opinion[5]. It was found that distilled water, $NaHCO_3$, NaCl, and KCl, as well as ohter electrolytes caused violent tetany when injected into the spinal canal of rabbits and dogs. The intra-thecal injection of $CaCl_2$ antagonized the tetany so produced. These results were in no way due to increased pressure of the cerebro-spinal fluid as the fluid was withdrawn in most instances before the injection was made and the obturator was not replaced until sometime after the injection had been made.

The following protocols will indicate in more detail the manner in which these experiments were carried out.

No. 1. Rabbit (male)—2 kilos.

12:00 noon—½ grain of cocaine hydrochloride subcutaneous and intramuscular over 4th lumbar vertebra.
12:05 p.m.—Lumbar puncture.
12:06 p.m.—2 c.c. of distilled water injected into spinal canal.
12:07½ p.m.—Intense tetanic spasms of all muscles.
12:10-12:13 p.m.—Artificial respiration.
12:13-12:45 p.m.—Tetany gradually diminished.
12:45 p.m.—Animal has control of fore limbs and shoulders.
12:55 p.m.—Animal running about.
Next day—Completely recovered.

No. 2. Dog (female)—6½ kilos.

3:45 p.m.—1 grain morphine subcutaneous.
4:10 p.m.—½ grain cocaine hydrochloride subcutaneous, and intra-muscular over 4th lumbar vertebra.
4:15 p.m.—Lumbar puncture.
4:17 p.m.—4 c.c. of 5 per cent. $NaHCO_3$ injected into spinal canal.
4:17½ p.m.—Tetanic spasm most marked in posterior half of body.
4:30 p.m.—Tetany practically gone.
4:50 p.m.—2 c.c. of 1 per cent. $CaCl_2$ injected into spinal canal.
5:00 p.m.—5 c.c. of 5 per cent. $NaHCO_3$ injected into spinal canal, no effect.

It should here be noted that Wilson[6] has demonstrated that parathyroid tetany is associated with an alkalosis of the blood while MacCallum[7] has found that symptoms like those of tetany can be induced by calcium deficiency and that symptoms following parathyroidecotomy can be relieved by calcium administration.

It would appear from the results reported that a decrease in the relative concentration of the calcium ion in the motor nerve cells acts as a stimulus and a tetanic seizure results.

It is possible that "muscle cramp" manifested at times in swimmers and runners is due to a temporary alkalosis following excessive respiration.

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Men and Books

COWPER—THE ANATOMIST

By W. A. McIntosh, *Major C.A.M.C.*

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ONE day in November, 1916, I was in Folkestone. I have found out since that the town was the birthplace of many notables, including William Harvey. It has numerous narrow streets, most of them crooked. Following one of these I ran into an old book shop. The shop is kept by Mr. Robert Jones. Mr. Jones early in life was attracted by old books. The attraction became an obsession, and he found relief only in selling old books. Men of this type are found in every town in England and if you will walk across the Bridge of the Arts in Paris towards the quarter that has seen France's greatest tragedies, you will find the same kind of men with the same kind of books.

Mr. Jones has a remarkable intuition. He at once recognized a victim and sold me an old book. I was intoxicated, but not with alcohol.

The discoverer of an old book once introduced his specimen this way:

> "Do you see this square old yellow book, I toss
> I' the air and catch again and twirl about
> By the crumpled vellum corners,—pure crude fact
> Secreted from man's life when hearts beat hard,
> And brains high-blooded ticked two centuries since?
> Examine it yourselves! I found this book,
> Gave a lira for it, eightpence English just,
> (Mark the predestination) when a Hand
> Always above my shoulder, pushed me once."

He then proceeded to tell its story in ten different ways.

I will not try so many ways, although the story may be inclined to wander into crooked paths. My old book is the first edition of "the Anatomy of Humane Bodies", by William Cowper. It was published in 1698 and, when I found it, was complete. One of

Read before the Harvey Club, London, Ont.

the plates was looted and my efforts of more than three years to duplicate it have so far been unsuccessful.

In my attempts to locate a copy of the stolen engraving I have visited many old book shops in London, more especially those in the neighbourhood of the British Museum, and have had access to the Library of the British Medical Association in the Strand where I found the only other copy of Cowper's "Anatomy" I have seen. The copy in the Association's Library is the second edition printed eighteen years after Cowper's death. The illustrations are from plates badly worn, and only a few are left in the book.

It was in the library of the Association that I was first informed that the plates in Cowper's book were pirated from Bidloo, the Dutch anatomist, and I was permitted by the librarian to examine a copy of Bidloo's "Anatomy" which had been presented to the Association by Mr. Ernest Hart who was editor of the *British Medical Journal* and president of the Association.

Bidloo's "Anatomy" which was published in 1685 has a counterpart of my missing plate and the librarian extended to me the privilege of having a photographic reproduction made, but I still hope to find an old one.

The only change Cowper made in the pictures was the addition of some markings for the elucidation of his text.

Cowper's book has as its frontispiece a mezzotint engraving of the author but all the rest of the plates in the body of the book are from Bidloo. They are referred to in the text as "Tables". Cowper has been severely censured for using them, but his use of them was not entirely without giving credit, as in his "Address to the Reader" he says:

"These figures were drawn after the life by the masterly painter G. de Lairess, and engraved by no less a hand and represent the parts of humane bodies far beyond any extant and were some time since published by Dr. Bidloo, now Professor of Anatomy in the University of Leyden."

This item of credit, however, is obscurely placed and very casual and elsewhere the attempt has been made to obscure the origin of the plates. The opening paragraph of the sketch of Cowper published in *The British Medical Journal* of January 15th, 1898, reads as follows:

"Cowper's glands are known by name to more persons than their discoverer ever expected or perhaps deserved, for he was not entirely honest in his dealings, though he was a good anatomist and the teacher of Cheselden."

In addition to two articles published in the *British Medical Journal* in January and February, 1898, the available sources of information in the reference libraries I have been permitted to consult are few. The longest reference to Cowper I have found is the one in the "Dictionary of National Biography" and is contributed by Dr. Norman Moore. There is a short account of Cowper in Garrison's "History of Medicine" published in 1913, and Dr. Roswell Park says in his history, referring to the period and its surgeons:

"There were also William Cowper (1666-1709) a famous anatomist and surgeon, and Woolhouse a famous but ignorant itinerant oculist."

Nelson's "Loose Leaf Encyclopædia" merely gives dates of Cowper's birth and death, states that he was admitted a Barber Surgeon in 1691 and published "Myotomia Reformata" in 1694.

The "Britannica" and other encyclopædias I have consulted have only brief references.

I have examined Renouard's "History" of Medicine and a small "History" by Nathan Davis and although Cowper's contemporaries are mentioned I have failed to find Cowper's name.

The pronunciation of the name is said to have been Cooper, but as the glands first described by this anatomist have always in my hearing been called Cowper's glands I have retained this pronunciation which has the additional advantage of avoiding confusion with the name of another of greater prominence and perhaps greater honesty, Sir Astley Cooper.

Cowper, the anatomist, was not related to Cowper, the poet.

At the trial of Spencer Cowper, an uncle of the poet Cowper, and brother to the Lord High Chancellor, for murder, William Cowper and Sir Samuel Garth were witnesses. Cowper, who was giving expert medical testimony, was asked whether any family relationship existed between himself and the accused, and the reply was in the negative. This trial, which seemed to follow a trumped-up charge and resulted in an acquittal, led to the resignation of Chancellor Cowper because of the temporary gloom which had been cast over his family by an unwarranted charge against his brother.

One searches in vain through anatomical and surgical books of the present day for any record of Cowper, the anatomist, other than references to Cowper's glands. (These glands are not described in Cowper's first edition, having been first mentioned in 1702.

In the by-ways of medical literature it is found that the Corrigan pulse credited to Sir Dominic John Corrigan, who died in 1880,

had first been observed and described by Cowper in 1705 In 1687 t is said, Cowper saw the passage of the blood from the arterial into the venous current of the cat and made a similar observation on the circulation of the dog. (Harvey's work on "The Motion of the Heart and Blood" appeared in 1628 and no doubt Cowper's investigations were stimulated by the medical atmosphere created by the work of Harvey.)

There is an egotistical flavour to Cowper's writings and he takes the opportunity here and there in the text of his book to intimate that there are inaccuracies in the work of Bidloo. This is observed in the description of the circulation in the placenta and in that of the arrangement of the spermatic arteries on the two sides. He is not dogmatic, however, merely stating that Bidloo's conclusions are not borne out by his own dissections.

Prior to the publication of Cowper's book, Dr. Hutton, who had become physician to William III. through having been available to attend an accident to Queen Mary, reported to Bidloo that Cowper was about to publish a book using Bidloo's plates, and otherwise plagiarizing upon his "Anatomia Corporis Humani". Dr. Hutton was apparently something of a busybody. This communication was the beginning of a long controversy with pamphlets and letters w th abusive references on both sides. Bidloo virtually accuses Cowper of stealing the plates, and Cowper replies that he had as much right to the plates as Bidloo as they had been originally made or Swammerdam. Swammerdam was a distinguished Dutch physician and naturalist, who had died in 1680. It was he who discovered that the lung of a person who had breathed would float, a fact that has been of very great value in investigations of cases of infanticide. The question as to whose plates the illustrations in question originally were appears to be still unsettled.

So far as Cowper is concerned, it has been said that the plates were first acquired by his publishers, Smith and Walford, and that they had asked Cowper to write text for the plates. It is probable, however, that Cowper was a party to the transaction, as it seems that he made occasional trips to Holland to avail himself of any information he might gain at the Medical School at Leyden, which was one of the most famous, and it is now believed that Cowper lent himself to a sort of underground transaction with a Dutch printer by which impressions from the plates (if not the plates themselves) were obtained for his use. The suspicion that Cowper was a party to this not altogether creditable arrangement receives some support by a curious bit of tangible evidence which I am able to show you here to-day.

In the ornamental and somewhat fantastic title-piece following the portrait of Cowper is a remarkable specimen of camouflage. The name of Bidloo on the plate together with the Latin title has been obscured by a thin piece of printed paper bearing the name of Cowper and the title in English, pasted over the original impression. Strange to say, this was discovered only a few years ago by Dr. Hewitt, Assistant Librarian of the Royal College of Surgeons, and attention is drawn to the fact in an article published in the *British Medical Journal*, January 15th, 1898, two hundred years after the publication of the volume. This piece of fraud, which remained undetected for two centuries, is very plain and Bidloo's name in the original Latin inscription becomes quite legible when the page is held up to the light.

Successive events in Cowper's career are:

1682. Apprenticed to William Bignall.
1687. Made important observations on arterial and venous circulation.
1691. Admitted a Barber Surgeon.
1694. Published "Myotomia Reformata".
1696. Elected Fellow of the Royal Society.
1698. Published his "Anatomy".

In all human probability Cowper, who had been associated with some of England's titled medical men, or one at least in the person of Sir Samuel Garth, had hopes that some day "Sir" would be prefixed to his name.

It is evident that there was a decided jealousy between Cowper and Dr. Hutton. Did the suspicion of dishonesty aroused by the use of the plates of Bidloo, fostered by the officious action of Dr. Hutton in his tell-tale report to Bidloo, and all the unhappy results that followed, result in loss of prestige to Cowper and loss of a prospective knighthood? The fact that he was the most famous English anatomist of his time would lend support to that assumption.

Dr. Norman Moore's notice of Cowper states that his text was in no way a plagiarism upon Bidloo, and that his book was a valuable anatomical work and that it took its place as the best English anatomy that had appeared.

The period was vastly different from to-day. It was one of great activity, however, and although there were no telegraph lines over land or water, no telephones, no electrical equipment of any kind except what was observed in nature, no typewriters, no friction matches, there were wonderful things written with quills and very

good lights produced with flint and steel and tinder box, and councillors of state knew how to "play their high chess game whereof the pawns are men" as well as they do to-day, although the pawns were fewer and the moves more deliberate. Electricity was not employed in medicine or in the arts and only the germ of the idea existed. The discovery of the fact that excited amber would attract small fragments of paper or similar material was made by Dr. Gilbert, the court physician of Queen Elizabeth, in 1600. Priestley was born after the death of Cowper, and all important applications of electricity were after his time

Medicine was making progress on the continent of Europe and notably in Holland. Anton van Leeuwenhoek, the pioneer microscopist, worked with instruments of his own make and made possible much of the minute work of Bidloo. He was contemporary with Bidloo and Cowper and outlived them both, dying at the age of ninety-one years in 1732.

It is stated in Phillips' "Dictionary of Biographical Reference" that Bidloo was physician to William III. This was probably before the arrival of the Prince of Orange in England, after which Dr. Hutton became the King's physician. Dr. Hutton was no doubt indebted to Bidloo for hints about how to manage William as a patient, and, being anxious to retain his favour, kept an eye upon his interests in England and trotted to him with reports of Cowper's intentions.

At the time of the publication of Cowper's "Anatomy", it is probable that there was no international copyright understanding between England and Holland, and even admitting Cowper's use of Bidloo's material, it was a moral and not a legal offence, and Bidloo had no redress except in the court of public opinion. He seems, however, to have made good use of that court. So far as domestic copyright is concerned there appears to have been a very definite recognition of proprietorship even in letters, the rights of authors being strictly recognized in the Common Law. The statute law concerning copyright is of comparatively recent date, having largely arisen from the Berne Convention in 1881 where representatives from many countries brought about an international agreement that a work copyrighted in one country is protected against unauthorized reproduction in another. Holland, however, was not included in the terms of the Convention, even of that late date, and it is highly improbable that there was an earlier understanding for mutual copyright protection between the two countries.

That the text was made for the plates and not the plates for

the text is quite evident upon perusal. The written portion is simply explanatory, the illustrations being full-page and the "explications" on a page opposite. Some of them are simply references to the figures throughout the whole description and some have comments which are apparently original. The pages are fourteen by twenty-two inches in size, the book is bound in leather and weighs twenty pounds. The engravings have a water mark "PL" about the middle of the sheet. There are one hundred and fourteen and they are printed from copper plates. The process of steel engraving was not discovered until 1820. Copperplate engravings while softer in character than those from steel are limited in number from the same plate, as the softer metal becomes battered and the later impressions may be indistinct. This is observed in the second edition of Cowper which appeared in 1737, eighteen years after his death. The illustrations in the second edition were probably made from the same plates as those in the first as the detail is much obscured. The impressions in the first edition were probably made in Holland and the prints and not the plates taken to England. The water mark "PL" is most likely that of a continental paper-maker The letterpress is excellent and there are ornamental tail-pieces at the end of each description.

The terminology is practically all in Latin and more resembles the nomenclature in the earlier editions of Gray's "Anatomy" than that of the later text-books in which the BNA. system has been pretty largely followed.

The portrait of Cowper is a mezzotint engraving by John Smith after Closterman. Closterman was a contemporary of Sir Godfrey Kneller Both were of German birth and both painted court subjects in England. Sir Samuel Garth was painted by Kneller. Kneller is the only painter honoured in Westminster Abbey. There is no doubt that influence has sometimes counted in the selection of subjects for honours among those who have been considered England's great men. I first learned Kneller's name in looking over a list of professional men mentioned in a description of the Abbey. Closterman painted the Duchess of Marlborough and the artist and the subject had frequent disputes. The Duke protested that he had as much trouble in mediating between them as in winning a battle.

Cowper's Dedication to Charles Mountague, is one of those laudatory productions common with writers of the 17th century. It consists of eulogy of the First Lord of the Treasury with depreciation of himself. Harvey's dedication of his book, "The

motion of the heart and blood," to Charles I. contains rather more wit with less self depreciation.

The introduction is a general physiological discussion fairly representing the views that were held at that time

The address to the reader refers to one hundred and five plates from Bidloo and nine in the appendix Whether or not the plates in the appendix are from Bidloo I am unable at present to say.

Cowper died in his forty-third year, in 1709.

About 1893 according to an article in the *British Medical Journal* of February 5th, 1898, the memorial stone to Cowper which has been in the chancel floor of the church at Bishops Sutton, in Hampshire, was on renovation of the church placed in the wall. That it is a typical English memorial stone will be recognized upon reading the following inscription:

Sacred to the Memory of
William Cowper
Youngest son of
Richard Cowper
of this County, Esq.,
A citizen and Surgeon of London.
Distinguished for Genius, Knowledge and
Experience, most humane and successful
in every branch of his profession, most
eminent in the Science of Anatomy
which, while he prosecuted with
unremitting perseverance, anxious
to complete his Treatise of Myotomy
he ruined his constitution by severe
labour and watchings, seiz'd at the
first with Asthmatick complaint,
and afterwards with the Dropsy
He died prematurely
on the 8th day of March,
in the year of our Lord 1709
and in the 43rd year of his age.
His afflicted Wife erected this Monument
to the best of Husbands.

Case Report

REPORT OF THE TREATMENT OF A CASE OF LEUKO-SARCOMA WITH MEDIASTINAL INVOLVEMENT

By H. H. McIntosh, M.D.

Vancouver

D. R., age eighteen years, admitted to the Vancouver General Hospital, September 15th, 1919. Complained of difficulty in breathing when lying down and of a constant cough. Father and mother living and healthy. The patient had been attending college, and during the summer, working in a saw-mill. At the age of six years he had measles followed by pneumonia and a long illness, culminating in an empyema, which discharged just below the nipple on the right side of the chest. Since then he has been well enough but inclined to be short of breath.

The present illness is dated to the first week in August, when he caught cold and the cough of which he now complains began. He is a pale, well nourished youth, looking rather septic, unable to lie down on account of increased difficulty of breathing and subject to a constant and irritating cough without expectoration. Appetite good; bowels regular; temperature 99° to 101°; respiration 30.

Examination of the chest shows dullness on percussion of both sides of the sternum, nearly out to the anterior auxillary line and an absence of breath sounds over the dull area. The position of the apex beat could with difficulty be made out, apparently somewhat outside the nipple line; all heart sounds are distant and muffled.

X-ray report: The centre of the chest, extending from the clavicle to the diaphragm is occupied by a dense shadow five inches wide at the upper part and eight inches wide at the middle and lower part of the chest. The left border of the shadow is smooth, the right border is irregular and there is seen an irregular shading off from the outline of the shadow into the lung structure. A dense white line is seen running transversely just below the centre of the chest on the right side, which is probably due to a thickened inter-lobar pleura. Viewed on the fluoroscopic screen no pulsation was

noted and viewed in the lateral oblique position it was seen that the mediastinum was occupied by the same shadow, there being complete absence of transparency. The condition is apparently that of a large mediastinal new growth.

Blood count: Red blood cells, 3,300,000; hæmoglobin, 75 per cent. The cells stain irregularly and nucleated cells are present. White blood cells, 28,600; polynuclears, 23·5 per cent.; lymphocytes, 68 per cent.; large mononuclears, 3·5 per cent.; transitionals, 3 per cent.; eosinophiles, 1·5 per cent.; basophiles, ·5 per cent.

A diagnosis of leukosarcoma was made by Dr. W. D. Brydone Jack and Dr. J. M. Pearson and *x*-ray treatment recommended. This was started September 16th, 1919. The following technique was used throughout the whole of the treatment. Coolidge tube, ten inch anode skin distance. 3 mm. aluminium filter. 7 m.a. 8½ inch spark cap. Time, four and one-half minutes. The skin over the front and back of the chest was mapped out into areas and two or more of these treated at each session. Treatment started with two areas only. The intention being to increase the number if the radiations were well tolerated, but even with that amount there was a considerable reaction at first and it was thought advisable to delay further increase. After the first treatments the patient was very drowsy, complained of legs in pain and back and was generally miserable.

On September 19th, 1919, the white blood count was 25,500; polynuclears, 19 per cent.; lymphocytes, 73 per cent.; large mononuclears, 6 per cent.; transitionals, 5 per cent.

By September 26th the patient was much improved, the cough lessened and breathing easier, improvement having been marked from September 22nd. Treatments were given twice weekly, it being found that frequent doses were tolerated fairly well; as progress was continuing, it was felt that too much radiation on any one day would be inadvisable. Accordingly the front and back of the chest, spleen, and long bones were rayed till October 28th. On October 7th, the patient was at his best, the cough had disappeared and there was no dyspnœa. The red cell count remained the same. The white cells were 36,000 with mononuclears large and small producing together 85 per cent. as against 80 per cent. September 30th, 79 per cent. September 19th, and 71 per cent. September 13th.

About the end of October his cervical glands became much enlarged and from this time forward glandular enlargements appeared in the axilla and inguinal regions. Nodes formed in the scalp, rapidly increasing in size, some being larger than pigeon's

eggs. The nose and naso pharynx became plugged and there was some deafness. There was frequency of micturition and pain over he bladder; both testicles became swollen to more than twice their normal size. No pain or tenderness, however, accompanied this enlargement. All these symptoms did not arise at one time nor were they all present at any one time, but occurred at intervals throughout the remainder of the illness. As the enlargements occurred and the various symptoms just mentioned above arose, these areas were all subjected to radiation which was followed by a most miraculous disappearance of the enlargements and amelioration of the symptoms. Within forty-eight hours large glandular masses in the neck disappeared and the nodes in the scalp seemed to melt away. The obstruction of the nasal passages and the deafness were still persistent but a great deal of relief was experienced following the treatments on this area. The swelling of the testicles was reduced at once though this recurred a few days before death.

As would be expected from the rapid improvement in breathing and the disappearance of the cough, radiographic appearances in the chest showed similar improvement. Radiograms were taken September 13th, September 30th, October 31st and November 20th. In the one taken November 20th, all signs of the growth in the mediastinum had disappeared.

He left hospital on this day, returning afterwards for treatment. Thus so far as the treatment of the local manifestations was concerned, radiation had a magical effect. Unfortunately the progress of the general condition was downward. By December 16th, the red cells were reduced to 1,300,000. The blood had taken on more of a pernicious anæmia aspect, hæmoglobin being 70 per cent., producing a high colour index with polychromatophilia present, microcytes and macrocytes, normoblasts and megaloblasts. There was a remarkable reduction in white cells to 9,700; the differential count remained the same. From this time onward he went steadily down and died January 22nd, 1920.

The report is incomplete as no autopsy was obtained and the reason for presenting the case is the wide-spread lymphatic involvements which were so rapidly made to disappear under *x*-ray treatment.

Editorial

THE NEW RELATIONSHIP BETWEEN THE STATE AND THE PRACTITIONER IN ENGLAND

THE future of medical practice in England has recently been the subject of a discussion at the *British Medical Association*. Nationalization of the profession was condemned by all as an impracticable procedure. The work of the practitioner is essentially individualistic and the relationship of patient and practitioner cannot be abolished advantageously by State intervention.

That changes are required and that a closer relationship between the State and the profession are necessary must be admitted. The relationship between the two bodies is indeed in a process of evolution. Such enactments in recent years as the Insurance Act, the Workmen's Compensation Act, and Midwives Act have thrust new obligations on practitioners and for such services they are compensated by the State.

Sir George Newman pleads for a better understanding between the State and the medical profession on questions relating to curative and preventative medicine. A complete reorganization of the various public health bodies is required to prevent overlapping and duplication of work. At present five local authorities are concerned with maternity and infancy; three with school children; six with individuals of unsound mind or mental deficiency. With such a system, or lack of system, the work must be expensive and ineffective. A single authority with subdivisions is clearly a first essential in any measure of reform and this requires the earnest co-operation of the State, the public and the profession.

In order to cope with new conditions improvements in

medical education must be constantly borne in mind. Medical schools and post-graduate courses must be prepared to furnish improved training "in preventive medicine and in the political science of commercial responsibility." With well educated general practitioners the future is secure, and to them must be assigned a large share in the education of the public in measures necessary to preserve health as well as dealing with the care of the sick.

The large proportion of men rejected by the army for physicial defects, many of them of a preventable character, has roused not only in the profession but in the public, a demand for more active prophylactic measures. The vast hospital establishments for the armies, which carried out so successfully the problems of the prevention and the treatment of disease, have also emphasized the need of supplying the profession with more suitable surroundings than the domicile of the patient for the care of many of their patients. As Sir W. Herringham points out it is only the very rich and the very poor who can now obtain the advantages of a full clinical and laboratory examination in case of sickness. Even when complete diagnostic procedures have been carried out suitable treatment is often impossible at home or even at many nursing homes, many of which are merely expensive boarding houses, defective in equipment and good nursing facilities.

In a preliminary report the General Consultative Council has suggested a tentative preliminary scheme to remedy these defects. The council is opposed to the nationalization of the profession and to converting it into a state service. It is proposed to establish primary and secondary health centres throughout the country. The primary health centres are virtually cottage hospitals scattered through the smaller centres of population and staffed by the practitioners of the district, each of whom attends such of his patients who desire institutional rather than domiciliary treatment. They are to contain wards of varying size, and also provision for

midwifery, operating room, radiographic rooms and laboratory, and facilities for open air treatment and physio-therapy. It is also arranged to instal a dental clinic, services for prenatal care and child welfare, physical culture and the early treatment of tuberculosis and of occupational diseases. Special department services for venereal disease, and for tuberculosis, presided over by a part time paid practitioner who has qualified in one of these subjects, are also regarded as a necessary part of the work of the primary centre.

The secondary centres are much more complete in equipment and are to be located in the larger towns, where existing hospitals may be utilized for the purpose. They are to be staffed by consultants and specialists and are designed for the treatment of more serious or obscure cases; they would draw their patients from the primary centres or directly from the homes of the patients.

It is proposed that the staffs of existing hospitals may continue to act and also take on such extra duties as acting as consultants to the primary centres, such services to be paid for as special fees or to be arranged on a part time basis.

The expense of such extensive changes has not been worked out but it is suggested that about £1,000,000 yearly will be required. Whether this can be saved by reforms of other existing sick relief funds or whether it will have to be provided by the ratepayers, appears to be a small matter in view of the great advantage to the public in having a well organized and competent medical service through the country.

RECENT ADVANCES IN PHARMACOLOGY

(*The Cinchona Alkaloids and their Derivatives*)

THE great advances made in the department of pharmacology have been placed before the profession in two interesting lectures recently delivered in England; one by Professor W. E. Dixon at the Cambridge meeting of the *British Medical*

Association; the other by Mr. C. A. Hill in his presidential address before the British Pharmaceutical Conference.

Looking back on the "Materia Medica" of the early part of the last century one recognizes how many of the drugs of that period have been discarded. A few new ones have been introduced but the most important additions have come chiefly from the chemist's laboratory. To the chemist we also were indebted for our knowledge of the various active principles on which the therapeutic activity of our drugs derived from the vegetable kingdom depends, and as a consequence one or more of these active principles in great measure supplanted the use of the crude drugs in our therapy.

During recent years chemists have added still more to our knowledge and to our therapeutic powers. With the knowledge of the chemical constitution of these active principles, chemists have gradually discovered methods to modify that composition by the introduction of new elements, and thus render these active principles more suitable and more effective for therapeutic employment.

Our increased knowledge regarding cinchona and its alkaloids as detailed by Professor Dixon in his address, illustrates in a very interesting manner the importance to the State as well as to the physician of this research work.

Cinchona bark was first introduced to the profession as a remedy for the successful treatment of malaria in the sixteenth century. In 1820 its alkaloid quinine was isolated, and shortly afterwards its other alkaloids quinidine, cinchonine and cinchonidine were discovered. The quinine salts gradually superseded entirely the use of the crude bark; the other alkaloids were given a very inferior place in our therapy. Careful clinical work, however, with these alkaloids during the recent war when quinine was difficult to obtain in sufficient quantity, has shown that the previously despised alkaloids, cinchonidine and quinidine, are actually more effective than quinine in curing cases of benign tertian malaria. Still further, recent attempts by chemists have been suc-

cessful in so modifying these alkaloids found naturally in the bark, as to produce new alkaloids, which it is hoped will prove still more therapeutically efficacious than the original alkaloids. Hydroquinine is a reduction product which experiments appear to indicate more effective than quinine in the treatment of malignant tertian malaria. Some derivatives give promise of important therapeutic powers in other directions. Ethyl-hydrocupreine, one of the most interesting, will kill pneumococci at a very low concentration, and it had been found possible to cure animals of pneumococcal septicæmia by its intravenous injection. Other quinine derivatives appear to possess very definite local anæsthetic and antiseptic action.

The work of testing the exact action of these derivatives must necessarily be slow. The only practicable method is to carefully try the most promising ones by experiments on animals, and to pass on to the clinician the few selected ones.

These results, however, indicate the lines upon which some of the most important developments of pharmacology are proceeding.

Such researches may also be of importance to the State. During the past few decades quinine could only be obtained in large quantity from the plantations in the Dutch East Indies where the *cinchona rubra*, the species of cinchona which contains quinine in large amount, will grow well. Its cultivation in India was tried but never proved successful. Several species, however, which yield high percentages of the other alkaloids will thrive luxuriantly in India. If these alkaloids can be shown to be as, or even more therapeutically effective than quinine, the great needs of the Empire can be supplied by India.

Among much important work carried through at the Ontario Medical Association, the following resolution on the Standardization of Drugs was passed. It is a matter in

which every member of the Canadian Medical Association is interested and we are gladly calling attention to it.

"That the attention of the Ontario Medical Association having been called to the danger to the profession and to its patients that arises from the impurity and lack of physiological standardization of such important drugs as digitalis, it instructs the Executive Committee to take up this matter with the Department of Health of the Dominion of Canada and request that it undertake at once to safeguard the profession against this dangerous condition of affairs, and that a copy of this resolution be sent to the Canadian Medical Association."

We are interested to learn that an invitation to the Chair of Pathology at the Government School of Medicine, Cairo, Egypt, has been extended to Dr. William Boyd, Professor of Pathology, in the University of Manitoba. Canadian medicine is to be congratulated that Dr. Boyd has declined the offer.

We regret to be obliged to call the attention of our subscribers to an error in the binding of the September Journal in that in a number of copies certain pages (800 to 816) were omitted, and the sixteen pages following substituted. Any subscriber in receipt of such a copy may obtain another in its place without charge by applying to the office of the Journal, 836 University Street, Montreal.

Correspondence

MEDICAL EDUCATION

To the Editor

A GREAT deal of discussion has been going on lately regarding changes in the Medical Curriculum of the different universities. I am sure your readers, whether they are teachers in universities or not, are all deeply interested in a subject which concerns so intimately the education to be received by the future practitioner of medicine.

The subject was set apart for special discussion under the heading of the "Section of Medical Education" at the last meeting of the British Medical Association held at Cambridge. The foremost teachers and thinkers of the British medical world took part in this discussion and a perusal of their remarks, as reported in the *British Medical Journal* makes very interesting reading to those of us who follow the subject as it has been discussed by our universities in Canada.

To my mind one of the best speeches delivered in the Discussion was that given on behalf of Anatomy by Arthur Keith F.R.S., M.D., etc., the Conservator of Museum and Hunterian Professor of the Royal College of Surgeons, England. I trust you will bear with me if I quote at some length some of his remarks, as I know that many of the readers of your Journal, even if they do take the *British Medical Journal*, do not always, especially during the dog days of summer, read these articles through.

"Is there really anything radically wrong—something which cries out for instant amendment—in our modern system of medical education? If there is anything seriously amiss, is it not a strange fact that no complaint comes from the individuals most concerned—medical students, newly fledged graduates who are facing the difficulties of practice for the first time, nor even from the great public? It is from the teachers, not from the taught, that the cry for reformation emanates. The fifteen specialists who make up a teaching medical staff complain because a young brain cannot absorb in five years the extent of knowledge and ripeness of judgement which they have mastered in a collective period of three

hundred years. The physician, the surgeon, the obstetrician, the eye surgeon, the ear surgeon, the skin surgeon, the neurologist, the orthopædic surgeon, the pathologist, the bacteriologist, the pharmacologist, the teacher of hygiene, the physiologist, the biochemist, and the anatomist, match their several repertories of knowledge with that of the candidate for qualification, and hold up their hands aghast at the result of the comparison. My sympathies are entirely with the single head which is expected to hold so much. The problem we have to face, in this year of grace 1920, is not how to improve the education of the medical student but how we are to educate and reform his teachers.

You may say—get rid of specialization; pick your professors from the best-equipped general practitioners. You cannot do that without arresting the progress of medicine; every profitable step forwards we have ever been able to take we owe to men who have specialized in some department of knowledge. Without specialization there can be no progress. No man is fit to profess or teach any branch of knowledge unless he has a first-hand experience of his special branch, and is not only capable of adding to its stock of knowledge, but of showing his pupils how improvements can be wrought. The medical teacher must be a specialist, and no measure that we can take will prevent the increase of specialism as time goes on. The specialist teacher we must have, *but we must also have the general practitioner.* I cannot foresee a time when less than ninety out of a hundred medical men must be able to recognize and treat every one of the bodily ailments which afflict mankind. The real problem we have to solve is how a *staff* of specialist teachers is to produce an *army* of effective medical practitioners.

Is it too much to expect every medical teacher to keep his professional knowledge in such a state that, if called upon, he could resume or assume the role of general practitioner? I do not think it is. That is and can be the only guide a teacher has as to what he must expect his pupils to know. . . . The teacher who does not keep himself in touch with his profession handicaps himself, as well as those entrusted to him as pupils. With a reformation in the medical teacher of this kind we should probably hear less of that failing of the distinguished specialist, whose vision is limited to his own speciality—be it physiology or surgery. In short, I hold that no man is fit to teach medical students unless he himself is a qualified practitioner and maintains his knowledge in a state which would permit him to ply his real vocation. . . .

There is another matter which lies close to the core of all our

difficulties concerning medical education. It is this: Every teacher is, or at least should be, a researcher. He wishes to devote his energies in all his years, but particularly his earlier years, to his chosen subject. His legitimate ambition is to raise a school of research students. His department is run for the increase and improvement of his own particular branch of knowledge. And yet I think most teachers will agree that in a class of one hundred students there may be one—not likely more than one—promising recruit, and yet it is for the needs of the one and not of the ninety-nine that the department is run. This is a narrow, and I think mistaken, outlook on the part of many of our distinguished teachers. If the teacher applies himself to meet the needs of the ninety-nine, who are to practise medicine generally or some special department, he will not fail to waken the latent qualities of the promising research student. . . .

One other matter which needs reform is the scope of our text-books. . . . The time has come when a clear distinction must be drawn between the student's text-book and the work of reference. As time goes on the difference between them must become greater and greater. The greatest sinners in this respect are the anatomists and physiologists; their text-books could be reduced by half, with an improvement in the education of the man who is to practice general medicine. . . .

As a teacher of some years' experience the foregoing remarks of Sir Arthur Keith appeal to me as very sensible and very much to the point in the subject under discussion. I am sure they will appeal equally to those of your readers who are engaged in the practice of their profession, whether as general practitioners or specialists. In any case I feel that we here in Canada who are striving for a better day in teaching our medical students ought to take cognizance and perhaps advice from the men in England who have devoted themselves to the profession of teaching medical students.

J. M. ELDER

731 Sherbrooke St. W., Montreal, September 4th, 1920.

THE INTERNATIONAL CONGRESS OF PHYSIOLOGISTS HELD AT PARIS, JULY, 1920

To the Editor:

AMONGST the other irritating results of the colossal impudence of the Germans in 1914, was the making of it impossible for physiologists to assemble together as was their wont every three years. But now that the Teutonic incubus has been lifted from the cultivation of science, physiologists of all countries within the pale of international decency were able to meet together in Paris from Thursday 15th to Tuesday 20th, July, 1920.

The Congress was under the presidency of Professor Richet of the Chair of Physiology at the Sorbonne who was assisted by the Vice-President, Professor Gley of the Chair of General Biology at the College de France. The weather was gloriously fine and Paris, the beautiful and ever young, never looked better.

The Congress was informally opened on the Wednesday evening by a "*réunion amicale*" in the laboratories of Physiology at the Sorbonne. It was a conversazione where smoking was permitted, and it gave opportunities for old friends to foregather and to make arrangements for the coming week. Men whose names are famous all over Europe wherever physiology is studied, strolled about with cigar or pipe, accessible to every one, hailing old acquaintances.

At ten o'clock next morning the Congress was formally opened by a convocation in the Great Lecture Hall of Chemistry at the Sorbonne. The amphitheatre had been transformed by means of crimson curtains and gilded chairs into a salle d'honneur for the occasion. Professor Richet occupied the chair and was supported by the Minister of Education, Professor Gley, Professor Fano, Professor Fredericq of Liege; Professors Sir Edward Schafer, Langley, Sherrington, Waller and others.

The President's address was simple, dignified and impressive. He began by recalling the names of those physiologists who had passed away from their labours since the last Congress at Croningen in 1913. No sooner had he finished this part of his discourse than the whole assembly rose to their feet and remained standing in silence for some short time. It was quite spontaneous, so French, so exactly the thing to do at the moment, yet without a trace of anything theatrical or insincere.

The latter part of the Presidential address was an interesting survey of such advances in physiology since 1913 as have necessi-

tated a change in our views regarding certain problems. In particular, reference was made to the value of the researches of the American physiologists under Benedict into metabolic exchanges at rest—the so-called "basal metabolism". The way in which German work was quietly ignored was very refreshing. Professor Fano, the new occupant of Luciani's chair at Rome, was the next speaker; the subject of his discourse being the two cerebral attributes of volition and inhilition. He made used of data obtained through injuries to the human brain in the late war.

The afternoon was devoted to the reading of papers and to witnessing demonstrations for which purposes the Congress was divided up into no less than five sections which had to meet simultaneously.

At half-past eight the members were invited to witness a display of scientific kinematography at the Institute of Oceanography in the Rue St. Jacques. At this séance the Prince of Monaco and his suite were present. The demonstrations were exceedingly interesting, those of the amœboid movements of the leucocytes in frogs and in human blood being particularly instructive. The rate of reproduction of the films had been accelerated to 60 or 80 times the normal, so that instead of seeing leucocytes advance on bacilli in the leisurely fashion of their own positive chemiotexis, they appeared to bolt in and out amongst the rouleaux of red discs like so many rabbits amongst the ferns of the warren. Another set of illustrations was equally remarkable: men and animals had been photographed walking, running and leaping, both at the rate necessary for the normal reproduction of these movements, and also so rapidly that the transit of the pictures could be brought down to a very slow rate without, however, producing any flicker. The illusion in the artificially retarded series was very curious: one saw, for instance, a man with a pole in his hand approach a high gate, slowly place the pole on the ground, rise leisurely into the air, float slowly over the gate and then, having left the pole upright behind him, sink slowly down on the other side. The pole meanwhile fell on one side with a dignity and grace that would not have shamed a Vere de Vere. As a physiological study of the various groups of muscles co-ordinated in actions of this kind, the demonstrations were very valuable. Other series were, the cure of avian beri-beri; the heart and lungs in action in the opened thorax of the cat, hydro-medusæ in their tanks, a cat let fall back downwards rotating itself so as to alight on the ground on all fours, and the flying of birds and of butter-

flies in artificially retarded action. The secretion of pancreatic juice after the injection of secretin into a dog was clearly demonstrated, as also the artificial digestion of a cube of albumen by activated pancreatic juice in presence of the necessary controls. This last demonstration was very remarkable, for in a few moments we were shown the chemical disintegration of the protein into soluble substances which in reality occupies more than nine hours.

Saturday until six o'clock was given up to the scientific work of the Congress. At nine in the evening Professor and Madame Richet received the members in their large and handsome house in the Rue de l'Université. It was fortunately a fine, warm evening so that we were able to stroll about the illuminated garden where the conversations were not exclusively on scientific subjects.

On the Sunday no scientific work was undertaken, but an excursion was made to the Park and Chateau at Chantilly, a place best known to many Englishmen as the site of a race-course. This proved a very enjoyable visit; the interior of the Chateau is decorated in the stately and gorgeous style of the Renaissance, and the house contains some fine paintings, besides miniatures, valuable gems and other treasures.

Monday saw the Congress busily at work again until 5 o'clock, when there was a large reception at the Hôtel de Ville. This was given by the Mayor of Paris and the City Council; it was a full dress affair as might be inferred from the costumes of the ladies, and from the uniforms and cocked hats of the attendants by whom we were ushered up marble staircases to painted halls. There were speeches of welcome and speeches of thanks in response, and those versed in such matters averred that they heard on the outskirts of the assembly sounds suggestive of nothing so much as the sudden freeing of the gaseous pressure of the surface of champagne.

At nine o'clock the same evening a soirée was given by the Clube de la Renaissance française in Rue de Poitiers. This consisted of a concert of chamber music in which piano, 'cello and harp all took part. Not for long had some members of the Congress, they said, enjoyed an evening so much, for they had been enabled for an hour or two to escape from the auditory discords of the streets and live in an atmosphere of pleasing sounds.

Tuesday saw the Congress at its work again until half-past two when the séance de clôture took place. At nine o'clock the same evening the Rector of the University of Paris gave a formal reception to the Congress in the magnificent salons of the Sorbonne.

This was a full dress conversazione; the entertainment provided, besides some singing, being a recitation by a young actor of one of Alfred de Musset's poems.

During the week several dinner parties and lunches were given; both the President and Professor Gley acting frequently as hosts. The number of ladies who as physiologists participated in the Congress was larger than at any previous meeting, Great Britain being particularly well represented in this respect. Not many American or Canadian physiologists attended the Congress. American Physiology was, however, represented by Professor Neil Stewart, LL.D., of Cleveland, Ohio, Professor Frederick S. Lee, of Columbia University, New York, Professor Graham Lusk, of Cornell University, New York, and by Dr. L. G. Henderson, of Harvard University. From Canada there were only Professors J. J. R. Macleod, of Toronto, and Fraser Harris, of Dalhousie, Halifax. The subjects discussed at the Congress are too numerous to be dealt with in the detail they deserve.

The physiology of adrenalin was the subject of prolonged debate. In particular, doubt was cast upon the reliability of some of the methods for the detection of that hormone in the blood and upon the alleged rapidity with which adrenalin is increased in a very large number of different conditions, some accompanied and some not by emotional factors.

The topics of diabetes, of the psycho-galvanic phenomenon of Waller, human calorimetry, the transport of carbon-dioxide in the blood, and the condition of the respiratory centre in shock, were all discussed at as great length as the overloaded state of the programme permitted.

The Congress was too short to deal adequately with all the difficult problems presented for solution. Some of us were just beginning to know one another and to discuss subjects of mutual interest when it was time to part. It was all too short for any lover of Paris, for no lover of brightness and beauty leaves Paris without regret. Some departed for the shell-scarred battlefields of the greatest war in history; others, ere they returned to the routine of their lives, gave one more glance at the gardens of the Tuilleries lying in the golden sunshine of the perfect July afternoon as it brought out all the vivid colours of the flowers grouped with such unerring tastes. Memories of the past had been crowding in all that week; did not the word "Sorbonne" at one time impart everything that strove against scientific enlightenment, and connote everything that stood for the obscurantism of the

Middle Ages? The historically minded could not but recall that it was in the gardens of the Tuilleries one day in 1819 that Laennec devised the first stethoscope. He had been watching some children place their ears on logs of wood to hear sounds conveyed through them, and, seizing on the principle underlying the children's play, he soon invented the stethoscope, one of the earliest instruments of modern medicine. As we strolled across the gardens we gave a parting glance at the sun-bathed roofs of the Louvre, the most magnificent Palace in Europe, a building whose history is an epitome of the wonderful story of France herself—of her glories, her triumphs, her crimes and her sorrows.

D. Fraser Harris

Abstracts from Current Literature

ON THE TREATMENT OF COMBINED DIABETES AND NEPHRITIS

The practitioner occasionally meets with cases in which he has to deal with diabetes complicated with nephritis and a definite amount of arterio-sclerosis. In an interesting paper (*Jour. Am. Med. Assoc., Vol.* 75, *No.* 7) Dr. Frederick M. Allen with his associates, Mitchell and Sherrill, discuss the ætiology of this combination of diseased conditions and the treatment of it. While it is conceivable that a primary arterio-sclerosis might damage both the kidney and the pancreas, it is scarcely conceivable that a pure nephritis could cause a diabetes. A nephritis may possibly cause a hypertension, which may lead to an arterio-sclerosis that may injure the pancreas. On the other hand diabetes has for some time been regarded as a cause of arterio-sclerosis especially in elderly people owing to the frequent incidence in such patients of gangrene. In diabetics a form of albuminuria frequently occurs which clears up under diabetic treatment indicating a certain amount of irritation. In addition to this diabetes may induce a disturbance of nutritive function in all the cells of the body, lowering their power of resistance and rendering them more susceptible to injury. Nevertheless, statistical observations on one hundred unselected diabetics appear to indicate that diabetics do not show any higher proportion of clinical nephritis or impairment of nitrogen excretion than other hospital patients at corresponding ages, but manifest a slight tendency to retention of chlorides, vascular hypertension and arterio-sclerosis.

The treatment of combined diabetes and nephritis is to be

conducted according to the lines indicated for each diseases. A special difficulty is sometimes supposed to exist in their combined management but recent methods have largely obviated the conflict. Diabetic treatment by means of a high protein diet may be inimical to an associated nephritis with impaired nitrogen excretion, but it is possible to adjust the protein ratio to both diseases. If meats are forbidden in the treatment of hypertension, the diet of a diabetic with hypertension is seriously limited, but with restriction of salt such a patient can choose his protein at will. The problem of providing the necessary calories is solved by undernourishing the patient to the point at which he can tolerate 30 grms. of carbohydrate, since an unusually low protein ration raises the tolerance for carbohydrate and it is possible to complete the diet with fat without inducing acidosis. The diet is a hard one because of the close restriction of carbohydrate, protein, total calories and salt.

The treatment of diabetes and the reduction of obesity sometimes suffice to reduce blood pressure; a hypertension which is resistant to these measures and to rest sometimes yields readily to salt privation. It may be said that the majority of cases of combined diabetes and nephritis offer much hope when treated with necessary thoroughness, and that many of the later distressing complications may be avoided.

THE ROLE OF DEEP ALCOHOL INJECTIONS IN THE TREATMENT OF TRIGEMINAL NEURALGIA.

Harvey Cushing writes (*Jour. Am. Med. Assoc., Aug.* 14, 1920) that while deep injections of alcohol into the nerves near their foramina of exit from the skull have largely superseded peripheral neurectomies, the proceeding has very definite limitations. The relief is temporary and apt to be of shorter duration after each injection. There may be distressing after results such as paralysis of the oculomotor nerve and locking of the jaw from infiltration and subsequent fibrosis of the pterygoid muscles. Still more distressing are the labyrinthine troubles due to an accidental injection reaching the middle ear. The intra nasal injection as practiced by rhinologists is to be decried; and in no case should an attempt to be made to inject the Gasserian sheath itself. With such perfect and permanent results as may be secured to-day by a trigeminal sensory root avulsion, the prolonged use of injections in refractory cases should be discontinued.

Alcohol injections are the treatment of choice when the neuralgia

is limited to one of the two lower divisions, but when the neuralgia has spread beyond the original area and has extended to areas supplied by the adjacent division, a trigeminal neurectomy must be contemplated. Alcohol injections are sometimes useful in determining in doubtful cases whether the syndrome is a true neuralgia of the tic douleureux type or one of the rare pseudoneuralgias not amenable to relief by injections or neurectomies. They may also be serviceable in warning the patient as to the amount of numbness which will follow a neurectomy.

SOAPS AND EXTERNAL ANTISEPSIS.

Many varieties of the "healing", "antiseptic", and "germicidal" soaps, which are freely advertised and accompanied with claims of value have been the subject of experimental investigation by Dr. Norton (*Jour. Am. Med. Assoc., July* 31, 1920), working at the University of Chicago.

No one will minimize the importance of hands as vehicles in the transmission of infectious diseases. It is essential therefore to know the value of various soaps in removing and killing bacteria. Dr. Norton demonstrated that sterile hands are not obtained in the ordinary process of hand washing. Furthermore soap left on the hands after washing has no germicidal action, and soap solutions obtained in hand washing have no practical germicidal or antiseptic value. The cleansing properties of a soap are more important than its "germicidal" or "antiseptic" constituents; and the removal of bacteria may be accomplished as effectively, if not more so, by ordinary toilet soaps, as by the special brands of so-called "antiseptic" or "germicidal" soaps.

ON THE ABSORPTION OF THE ACTIVE PRINCIPLES OF DIGITALIS.

Dr. Eggleston writes that, as a rule, the absorption of the active principles of digitalis from the human alimentary tract, occurs with a considerable degree of uniformity (*Jour. Am. Med. Assoc., Aug.*, 1920). Specimens of digitalis are met with occasionally, however, which for some inherent reason are poorly absorbed, irrespective of the patient, although they appear to have an average biologic activity. Careful investigation has shown that absorbability from the human alimentary tract of these principles is not necessarily closely related to their biologic activity.

Hatcher has shown that digitalis can be readily separated into two distinct fractions by extraction of its aqueous solution with chloroform.

Twenty-three complete courses of experimentation were carried out using four different samples of the chloroform-soluble and one of the chloroform-insoluble extracts. It was shown that the activity of the chloroform-soluble fraction for man, is not materially different from that of the average high grade tincture of digitalis, when the comparison is made on the basis of the biologic activity of each as determined by its action in the cat.

The range of variability in the absorption of the chloroform-soluble fraction of digitalis, however, is much smaller than it is for representative good tinctures of digitalis. This greater uniformity of absorption as compared with that of high grade tinctures of digitalis marks a valuable advance in the pharmacy of digitalis.

The chloroform-insoluble fraction shows an obvious lack of value.

While the chloroform-soluble extract is not superior for oral administration to a good tincture of digitalis it is far superior to tinctures which are derived from a variety of sources, the absorption of which shows very marked variations when the individual specimens are compared.

The fact that one cannot get preparations of digitalis whose absorbability and biologic activity standards are always maintained, would appear to be the *raison d'être* for the refinements introduced in this chloroform-soluble preparation.

F. R. Brown.

Obituary

DR. J. T. I. HALLIDAY

At Peterboro, on July 4th, there passed away in the person of Dr. J. T. I. Halliday, the dean of the medical profession of this section of the Province. Born in the village of Grafton in 1844, he graduated with honours at McGill University, Montreal, in 1864, being at that time only twenty years of age. After waiting one year he received his license to practice, and immediately began his life's work in the village of Vernonville, north of Grafton in the county of Northumberland. After a short time he moved into Grafton, where he practised for several years. In 1882 he came to Peterboro and has there resided ever since.

He is survived by his widow, Miss Halliday and Mrs. Robert

A. Ross of Montreal. His two sons, Dr. Vernon and Mr. Charles Halliday, predeceased him a few years ago.

Dr. Halliday was by instinct and training a gentleman of the old school of family physicians, respected, trusted and beloved by a very wide circle of patients and friends. He was essentially a physician and spared neither time nor trouble to place himself abreast of that which was modern and best in the practice of medicine. For years he was the recognized surgeon of the Midland district, and in some respects was the pioneer of this department of our profession in this region. He was singularly successful in his practice, largely through intense devotion to his work.

In the profession he was respected by all, and through his death many physicians hereabout will feel that they have lost a friend who was ever ready to assist in their difficulties.

G. S. C.

Miscellany

Books Received

THE following books have been received and the courtesy of the publishers in sending them is duly acknowledged. Reviews will be made from time to time of books selected from those which have been received.

DISEASES OF THE CHEST AND THE PRINCIPLES OF PHYSICAL DIAGNOSIS. By GEORGE WILLIAM NORRIS, A.B., M.D., assistant professor of medicine in the University of Pennsylvania; and HENRY R. M. LANDIS, A.B., M.D., assistant professor of medicine in the University of Pennsylvania; with a chapter on ELECTROCARDIOGRAPH IN HEART DISEASE. By EDWARD B. KRUMBHAAR, Ph.D., M.D., assistant professor of research medicine in the University of Pennsylvania. Second edition, revised. 844 pages with illustrations. Price, $8.00 net. Publishers: W. B. Saunders Company, Philadelphia and London, 1920.

MANUAL OF PSYCHIATRY. Edited by AARON J. ROSANOFF, M.D., clinical director, King's Park State Hospital, New York. Fifth edition, revised and enlarged. Publishers: John Wiley & Sons, New York, 1920.

Book Reviews

THE ALMOSTS. A STUDY OF THE FEEBLE-MINDED. BY HELEN MACMURCHY, M.D., Director of Child Welfare: Department of Public Health, Ottawa. Publishers: Houghton Mifflin Company, New York, 1920.

This small but very interesting volume depicts the story of the feeble-minded as seen by our great novelists and dramatists, who long before the modern uplifter appeared on the scene, recognized that we have to deal with the mental defective as one of those many things in heaven and earth not dealt with in some philosophies, but yet which make a great difference to the community and social progress.

The story of the mental defective as pictured by Shakespeare, Bunyan, Scott, Dickens, Charles Reade, Nathaniel Hawthorne, and many others, is told, showing the lack of responsibility and the inability to grasp the problems set before such, either at school or in the later years of life, with the result that the unfortunates are exploited and imposed upon by the selfish, and cruelly treated, deceived and even persuaded into criminal acts by the unscrupulous. Often they are cast into prison to meet the punishment of felons, although they have no real conception of the wrong they have committed.

Such individuals under bad influences become a heavy burden to the State, while under proper influences they can be kept at small expense happy and safe, and even become of some service in the community.

We can strongly recommend this book as a very able presentation of a most important subject.

A. D. B.

SIMPLIFIED INFANT FEEDING WITH EIGHTY ILLUSTRATIVE CASES. BY ROGER H. DENNETT, B.S., M.D., associate professor of diseases of children, New York Post-Graduate Medical School. Second edition revised and enlarged. Price $5.00. Publishers: J. B. Lippincott Co., Philadelphia, London, and 201 Unity Building, Montreal, 1920.

This book is an excellent presentment of a practical method to feed infants who have to be fed artificially. The usefulness of

boiled milk is stated by the writer to have stood the test of many years of trial. It is not a review of the literature, nor is it a review of other methods or other theories of feeding, but it is a clearly written and practical statement of the method employed by the writer with much success in a large clinic in New York City. In addition new chapters have been added on Dry Milk, Acidosis, Salts of Milk, and on the Hypertonic Infant. It can be recommended to the general practitioner as a book in which he can find much useful information on the difficult subject of infant feeding with clearly expressed instructions for him to follow. A. D. B.

SURGICAL TREATMENT. BY JAMES PETER WARBASSE, M.D., surgeon to the Wyckoff Heights Hospital, Brooklyn, New York. Three large octavo volumes, 3000 pages with 2400 illustrations. Separate desk index volume free. Per set: cloth $30.00 net. Publishers: W. B. Saunders Company, Philadelphia and London. Canadian Agents: J. F. Hartz Co., Toronto, 1920.

Here is a book, or rather three books, combining Teutonic thoroughness with American practicalness. Warbasse, in these three large volumes, takes up practically the whole field of surgery in so far as surgical treatment is concerned. To cover such a field and to do it well, is indeed an achievement, and I think we can say that the author has done this. Taking the work as whole, one can only bestow commendation. Of course there are unevennesses. The style, as regards English, is not perfect; indeed, far from that; but one rarely finds in these degenerate days the combination of the practical man with wide knowledge and the stylist. On the other hand, the book is written clearly and the author's meaning is rarely obscure. To review the book in detail would be quite impossible. One has to take chapters here and there. In the chapter on hernia for instance, one notes that only two or three standard operations are described, that is for the inguinal form. These are fairly clearly set down, and the general practitioner, working with this book as a guide, would find it easy to follow the directions as set forth. The Willys-Andrews operation is given the first place. It is the opinion of many that that operation is not the best and can not stand comparison with the regular Bassini, which, as a matter of fact, is given second place.

The chapter on wound treatment and on infections generally is thoroughly well worked out, full advantage being taken of mod-

ern war experience. Of Dakin's solution the method of preparation is given in the detail which is necessary, and also the preparation of dichloramine-T, but there is perhaps insufficient critical judgement with regard to the advantages of these antiseptics as compared with others that were brought out during the war

In the chapter on blood transfusion directions are given for carrying out the agglutination test, but the Moss groups are not described, so far as the reviewer could find. The author describes in great detail the older method of direct transfusion from vessel to vessel, whereas, as modern surgeons are pretty well agreed, the best method now is certainly the indirect. Proper credit is not given to Kimpton and Brown for their devising of the paraffin coated glass tube. Perhaps too little credit, as a whole, is given to the authors who have been responsible for original work. Warbasse forestalls this criticism in his preface, but hardly with reason.

Going over the book as a whole one is struck with the completeness of it. One would have expected that the critical faculty on the part of the author might perhaps remain somewhat in abeyance, in view of the enormous number of subjects upon which judgement had to be given; but one is pleasantly surprised to find that, in nearly every line of work, the author contributes something of value from his own experience; and, after describing the operation or modes of treatment in vogue, concludes, usually, with a summary in which his own views as to the comparative value of the various methods are set down.

The book certainly is chiefly designed and written for the general practitioner who expects to do his own surgery in small places, and also for the surgeon who, though not attached to a large hospital in a large city, is still called upon to do a considerable amount of surgical work. These will find the work of great value. On the other hand, this is not to say that the experienced surgeon will find nothing that he is not familiar with in the three volumes. On the contrary there is a great deal that even the most advanced of the fraternity can discover with profit to himself and to his patients. Certainly the book is to be recommended to all classes of readers. The paper, print and type are all good, the illustrations numerous and clear, and the work as a whole does credit to the publishers

E. W. A.

PRINCIPLES OF HUMAN PHYSIOLOGY. By ERNEST H. STARLING, M.D., HON. ScD., Jodrell professor of physiology in University College, London. The chapter on the Sense Organs revised and largely rewritten by H. HARTRIDGE, M.A., M.B. Third edition. 1315 pages with 579 illustrations. Price $7.50. Publishers: Lea & Febiger, 706 Sansom Street, Philadelphia, 1920.

English-speaking students of physiology are fortunate in having an excellent selection of text-books from which to choose. Among these Professor Starling's "Principles" occupies a place of decided merit, being the mature work of a teacher who has himself made noted additions to the original literature of the subject. That the book should be authoritative and reliable goes almost without saying, and certainly so far as concerns the experimental data of a complicated science the work is admirable in its fulness. At the same time one may express a doubt as to the success of the author in so expounding the fundamental problems of physiology as to warrant his selection of the title "Principles" for the book. In reading it one cannot help feeling at times that it is hard to see the wood for the trees, a disability that is rendered if anything more marked by the comparative scarcity of sectional headings. The new edition, in which Dr. Hartridge has revised and largely rewritten the section on sense organs, is throughout of the same solid and serious quality as the earlier editions. While it consistently eschews lightness of treatment and is thus a hard book for beginners, it can thoroughly be commended to able and mature students.

J. T.

A MANUAL OF GYNÆCOLOGY FOR STUDENTS AND PRACTITIONERS. By SAMUEL J. CAMERON, M.B., B.CH., F.R.F.P.S.G., assistant to the regius professor of midwifery, University of Glasgow. Second edition, revised. 559 pages with illustrations. Price 25/ net. Publishers: Edward Arnold, 41 Maddox Street, London, W., 1919.

This manual of gynæcology brings out the problems of gynæcology in a very practical and concise manner. The author deals firstly with the anatomy and development of pelvic organs and points out clearly the lines along which development takes place, later showing with illustrations the results of faulty or non-development.

The chapter dealing with menstruation and its disorders has been clearly presented, due emphasis has been placed on the work

of Hitchmann and Adler in elucidating the various phases of menstruation and in clearing up the question of endometritis.

Reference is made to the rather unusual condition of cryptomenorrhœa and an effort made to distinguish between the conditions of imperforate hymen and the true condition of aliesia vaginæ with appropriate operative treatment appended.

The whole question of uterine displacements both from the standpoint of ætiology and treatment is briefly discussed and the suggestions offered by the author both in prophylaxis and treatment should be of value in dealing with these conditions. J. F.

OCCUPATIONAL AFFECTIONS OF THE SKIN. Their Prevention and Treatment with an Account of the Trade Processes and Agents which give Rise to Them. BY R. PROSSER WHITE, M.D., M.R.C.S., life vice-president, dermatologist, senior physician and enthetic officer, Royal Albert Edward Infirmary, Wigan. Second edition. 360 pages with illustrations. Price 25/- net. Publishers: H. K. Lewis & Co., 136 Gower Street, London, W.C. 1, 1920

That a book dealing with the effect of chemical and mechanical irritants on the skin should have reached a second edition within a few years is the best evidence of the excellent character of the work and the demand for it. The second edition does not differ materially from the first though it contains some minor alterations. The dermatoses described are arranged according to the trade processes giving rise to them and not from their resemblance to recognized types of idiopathic skin disease. A very valuable feature of the book lies in the descriptions which the author gives of the trade processes involved and the manner in which these tend to produce the skin lesions. In reviewing the book one is struck by the very large number of trades in which the workers suffer from either chemical or mechanical irritation and in the great variety of lesions which may be produced. G. G. C.

INDIGESTION: DR. G. HERSCHELL'S TEXT-BOOK OF INDIGESTION. Revised and re-written by ADOLPHE ABRAHAMS, O.B.E., M.D., assistant physician to Westminster Hospital, etc. Fourth edition. 228 pages with 8 plates. Price 10/6 net. Publishers: Edward Arnold, 41 Maddox Street, London, W. 1920.

The last edition of Dr. Herschell's text-book appeared in 1905

and our methods of studying the alimentary tract and its functions have undergone such changes in the interval that the present edition has been almost completely rewritten. After discussing the physiology of digestion and the nature and causation of indigestion, the author passes to the study of the patient. The value of a careful history is strongly emphasized and so also is the prime importance of a general physical examination prior to the detailed study of the alimentary tract. The special methods of examination are described in full. The various test meals, etc., are discussed and the author very rightly attaches to them a confirmatory rather than a diagnostic value. The completeness of the radiographic sections has suffered by a perhaps too liberal treatment of some of the older methods of examination, which are presented in unnecessary detail. The chapters on organic diseases of the stomach are excellent; the diagnosis, medical treatment and indications for surgical interference are dealt with along sound lines and leave little to be desired. The functional disorders are also covered in a comprehensive manner, and there is an excellent appendix on the preparation of food for dyspeptics. D. S. L.

DISEASES OF THE CHEST AND THE PRINCIPLES OF PHYSICAL DIAGNOSIS. By GEORGE WILLIAM NORRIS, A.B., M.D., assistant professor of medicine in the University of Pennsylvania; and HENRY R. M. LANDIS, A.B., M.D., assistant professor of medicine in the University of Pennsylvania; with a chapter on ELECTROCARDIOGRAPH IN HEART DISEASE. By EDWARD B. KRUMBHAAR, PH.D., M.D., assistant professor of research medicine in the University of Pennsylvania. Second edition, revised; 844 pages with 433 illustrations. Price $8.00 net. Publishers: W. B. Saunders Company, Philadelphia and London, 1920.

One can well understand the early appearance of the second edition of this book, presenting as it does the opinions of two men who are both well known for their excellent work. The book is divided into four parts, the first and second, by Dr. Norris, refer to the physical examination of the lungs and heart. These chapters are full, but there is little unnecessary detail. The numerous plates and photographs are well chosen and the production leaves little to be desired. Of special interest to teachers will be the description of methods of reproducing many of the pathological signs of the chest. The section is terminated by a much needed chapter on the physical findings in infants and children. The

heart section is comprehensive and the special methods of study include a chapter on the electrocardiograph by Edward Krumbhaar. Once again Dr. Norris' interest in the physics of the heart sounds and murmurs results in a most instructive section on the application of the Theories of Sound to the physical findings over the heart. Notes on the gallop rhythm, the third heart sound of Thayer, and the recent work of Bridgman on the presystolic sound and its possible relationship to the findings in Disordered Action of the Heart (D.A.H.) are all valuable as bringing the literature into the realm of the text-book. This section teems with points which up to the present have only been available to those making a prolonged search through the journals.

The third and fourth parts deal with the diseases of the respiratory tract and of the heart and aorta. Dr. Landis is a recognized authority on tuberculosis, and we reap the benefit of his experience in an excellent section on tuberculosis. The newer sections on the diseases of the lungs are particularly interesting; there is an excellent description of the pathology and physical findings of influenza, with a good critical review of the enormous literature which has grown up since the recent epidemic. The section on the diseases of the heart and aorta is also full of interesting material, and the author's remarks on myocardial disease, its importance and the difficulties in the way of its accurate diagnosis, are well worthy of note. There are also chapters on Congenital Heart Disease and Angina Pectoris.

The whole book is well arranged and can be heartily recommended, especially to those interested in the teaching of physical diagnosis. There is an excellent selection of references to the original articles. Krehl's "Clinical Pathology" is deservedly popular, but there is a healthy pride shown in the epoch making work of the English and American schools, expecially as regards the circulatory system. It is indeed a pleasure to see the large proportion of the references drawn from these sources, rather than from the Teutonic publications which have so overburdened the bibliographies of the past thirty years.

D. S. L.

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